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Costa Rica's Area de Conservación Guanacaste: A long march to survival through non-damaging biodevelopment.

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Daniel Janzen has researched as biologist, ecologist, and conservationist in the forests of Costa Rica. In September 1999 he gave the following paper at The Norway/UN Conference on the Ecosystem Approach for Sustainable Use of Biological Diversity in Trondheim. The paper has been slightly adapted for publication in the journal and Biodiversity thanks both the author and Odd Sandlund at NINA (Norwegian Institute for Nature Research) for permitting publication in the journal in advance of the publication of the proceedings. All photos were taken by Daniel Janzen.

INTRODUCTION

A large conserved wildland that is developed for its biodiversity and ecosystem services in a non-damaging way is an anthroecosystem. For that matter, so is a large city with its agroscape and trade links. If a large wildland is to survive today, it must be conserved by an "ecosystem approach for sustainable use of biological diversity." I view a conserved wildland as a somewhat disorderly garden that produces its crops in unconventional kinds of sacks and boxes. It is multi-cropped and multi-tasked, and has multi-users. And it requires the same intensity of care and thinking as does any highly successful agroscape or urban centre (Janzen 1998a, b, 1999a, b). Conservation into perpetuity demands the abandonment of models in which society is fenced out and the wildland

placed in passive institutional custody.

The Area de Conservación Guanacaste (ACG) in northwestern Costa Rica (<http://www.acguanacaste.ac.cr>) is such an ecosystem approach to the sustainable use of biological diversity and its resultant ecosystems. The ACG is one of 11 such conservation units at various stages of evolution in Costa Rica. Altogether they cover about 25% of the country and form the Sistema Nacional de Areas de Conservación (SINAC) (<http://sinac.ns.minae.go.cr>). In this essay on wildland management theory, I use the ACG



as an example because it is the entity that I understand best (Janzen 1983a, 1984, 1986a,b, 1987, 1988 a-e, 1993a, 1996a,b, Janzen *et al* 1993) and because it truly is non-damaging sustainable biodiversity development (a.k.a. biodevelopment) and ecosystem development. I do not avoid being "personal" and making person-specific commentary because specific persons are as much ingredients of the construction and custodianship of a conserved wildland as are impersonal "natural" elements and social forces.

There is no such thing as *impersonally* conserving and

One of the secrets to successful wildland conservation is a dedicated and self-interested group of staff. Here, Roger Blanco, Coordinator of the ACG Research Program and in front of Maria Marta Chavarría (also of the ACG Research Program), is intensely explaining the work of two paracologists (seated Gloria Sihezar, standing Freddy Quesada) to visitors from UNDP Costa Rica (out of sight). They are in the new caterpillar rearing barn at San Gerardo in Sector San Cristóbal in the ACG rainforest, and Oscar Quesada getting an eyeful of role models (18 January 2000).

View from over the Pacific northeastward across the dry forested coastal plain to the clouds over the cloud forests on Volcán Orosí and Volcán Cacao in the eastern ACG (dry season, 1987).



constructing a wildland so it survives into perpetuity. We have to move beyond the myth that a conserved wildland is a generic object that can be passively generated and maintained by bureaucratic processes that are institutionalized in national and international laws, regulations, and structures. While these social constructs, their technology, and their technical information are necessary and useful, they do not guarantee success. They are no more sufficient than they are for the emergence and function of universities, corporations, medical systems, stock markets, wars, political parties, internet, and other multi-person social synergies. The key ingredient is the dedicated and self-interested staff who takes responsibility for all relevant processes, and it is vital to sustain the cost of generating these kinds of personnel.

RELEVANT HISTORY OF THE ACG

ACG history is deeply imbedded in social events. The ACG has not been carved out of seemingly pristine wilderness in a battle with an encroaching agroscape, nor is it the result of an exercise in top-down biodiversity conservation

mapping of the kind fashionable among contemporary academic and international absentee custodial processes and organizations. Instead it was born in the friction and flames of a classical national park evolving into a conservation area. This evolution has been the direct response to the biological needs of the ACG coupled with those of the resident, national, and international societies in which it exists. When the ACG staff explore the area's biodiversity, it is for its non-damaging biodevelopment, and hence survival, rather than to find out whether or not it should be conserved.

The ACG's conservation process was set in motion in 1966. Kenton Miller (cf., Miller 1980) was then a young professor of natural resource management at the Instituto Interamericano de Cooperación para la Agricultura (IICA) at Turrialba in eastern (rainforested) Costa Rica. The Costa Rican government asked him to draw up a plan for a visitor-friendly national monument on 1000 hectares (ha) surrounding the Casona, the ancient central ranch house for the Hacienda Santa Rosa in northwestern Guanacaste Province. (The Casona was also the site of Costa Rica's two international battles.) This vaguely defined ranch of about 100,000 ha originally stretched from the evergreen-forested volcanoes on the east (Volcán

Orosí, Volcán Cacao) across a dry-forested coastal plain to the Pacific Ocean. Santa Rosa, the second oldest ranch in Costa Rica, dates from the late 1500s when it was established as part of an area to produce mules for part of the Caribbean to Pacific Ocean cross-isthmus international transport system. Over the centuries its dry forests were largely converted to pasture (a.k.a. "savannah") for cattle to feed the indigo trade in more northern Central America, the hide and tallow trade operating out of Puntarenas to the south, and eventually, the growing urban populations in central Costa Rica. Hacienda Santa Rosa was also used for timber, wild meat, water for irrigation, and croplands (Rice, Cotton, Sorghum, garden crops, fruit and nut trees, etc.), and much of it was burned annually during the six-month dry season. The Interamerican Highway was carved through its centre in the 1940s, and Jaragua pasture grass (*Hyparrhenia rufa*) was intentionally introduced from East Africa (via southern Costa Rica) about the same time. In the mid-1960s, when a major portion of it was expropriated, Santa Rosa was still an extensively managed cattle ranch owned by the Somoza family.

When Miller visited the site in 1966, the cowboys themselves showed him the magnificent complex of heterogeneously damaged dry forest stretching in a crude 20-km-long rectangle between the Pacific and the Interamerican Highway. In his report, he recommended the establishment of Parque Nacional Santa Rosa (Executive Decree 1562-A in 1971), which eventually came to replace the national monument (Law 3694 in 1966). Unconsciously, this classical national park establishment was an act of restoration biology. Miller's management plans also argued that the area immediately around the Casona should be preserved as cultural heritage, with operating pastures, range cattle, and cowboys (Miller and von Borstel 1968). This was never realized, however, because that was the very agroscape that the park was established to counter.

The vast area of "savannah" was, in fact, nothing more than introduced grass pasture and old fields, intermingled with many different ages of woody succession following centuries of burning and logging. The free-ranging cattle (from a large ranch to the south) were not shot out until 1978 and the anthropogenic fires (largely set regionally as part of pasture management) continued until the mid-1980s. It wasn't until the early 1990s that the last free-ranging Horses were removed because they grew fond of eating things out of tourist tents and backpacks. As these agromanagement processes were gradually snuffed out in Santa Rosa, the dry forest gradually began its overall self-restoration by drawing on the multitude of biological fragments that ranged in size from single organisms to secondary successional blocks several hundred hectares in area. Hacienda Santa Rosa, with more than 40 different owners over the centuries, had never been sufficiently successful as a farm/ranch for it to have been truly cleared of its biodiversity, nor were its original ecosystems altered beyond recovery.

Beginning in 1963, I was a highly esoteric ecologist who was exploring the incredible diversity of animal-plant interactions in Costa Rica's dry forests (e.g., Janzen 1967, 1974a,b, 1980, 1983a, 1993a). Conservation was "something" being done by Miller, Alvaro Ugalde, Mario Boza, the IUCN, the WWF, TNC, the Government – "those other people." I studied it, they saved it. Ugalde and Boza constructed the nascent Costa Rican Servicio de Parques Nacionales (SPN) in the 1970s and early 1980s with the "blessing" and appreciation of esoteric biologists like me, but with virtually no assistance from us other than

friendship and snippets of information. Conservation information and guidance came from a desire by Miller, Ugalde, Boza, and many other conservationists and environmental consultants to conserve "wilderness" before it could be taken over by the expanding population on a widening and intensifying agroscape.

My movement into the conservation cause began in May 1985, when Ugalde, then the Director of Costa Rica's SPN, asked me as a friend to do an environmental impact study of the 1500 gold miners who had invaded the rainforests of Parque Nacional Corcovado in southern Pacific Costa Rica. The situation was sufficiently catastrophic that Costa Rica was on the verge of a quasi-military operation to remove the miners. With a day on-site, the "environmental impact" study was complete. Intensive placer and pump gold mining totally trashes a tropical aquatic ecosystem



Jaragua pasture with scattered secondary successional dry (deciduous) forest remnants in central upland (300 m elevation) of Sector Santa Rosa of the ACG at the time that forest restoration began and when it was annually swept by anthropogenic fires; this view is in the centre of the photo on the opposite page (16 March 1987).

and unrestrained people do equally well in destroying the adjacent rainforest. For the remaining six days we studied the gold miners, and we asked them to study themselves. The instant discovery was that they felt perfectly legitimate doing something productive, such as mining for gold, on "land with no owner," which is how they defined the park because there was no visible social presence. Incidentally, this is the socio-political base for much "squatting" on formally titled lands in Costa Rica. We concluded that if the miners were clearly told that they were illegally "parked," so to speak, and on Day X they would get a parking ticket and be towed, they would leave (Janzen et al 1985). Ugalde's park service did just that, and on Day X in March 1986 only 298 remained to be symbolically arrested and peacefully removed.

Quite independently, Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO) asked my wife, field biologist Winnie Hallwachs, and me to spend August 1985 in northern and northwestern Australia, thinking with them about "how to create an Australian



presence in this enormous expanse of tropical dry forest” (an ecosystem not intrinsically attractive to a society derived directly from southern English counties). We largely concluded that science and agroscape-based ecotourism, research, conservation, low-yield long-term forestry, watershed management, etc., carried out and administered by resident Australians, was the way to go. While such a horizontal conclusion was popular in the Australian tropics, it did not sit well with the centralized and vertical national-level command and control structure for CSIRO research, management, conservation, and educational systems.

We returned to Costa Rica in September 1985. This was a time when the national

economy had taken a severe hit through a global drop in coffee prices, a drastic rise in fossil fuel prices, and the beginning of the decay of the Guanacaste Province cattle crop. Along with many other government programs, the SPN found itself with rising costs and severely shrunken budgets, yet increased needs and opportunities for staff, land acquisition, operations, and administration. Many national parks, including Santa Rosa, were effectively in stasis. In 1985, Santa Rosa’s annual operation budget was approximately \$65,000, including salaries, for about 20 “guardaparques” (many on loan from the Guardia Rural) and an administrator.

We returned with three realizations. First, we had never asked the question for Santa Rosa that CSIRO had put to us about the Australian dry forest area. Second, we had not understood how critical a visible social presence is for wildland conservation until we had been confronted with the moral conclusion reached by Corcovado’s gold miners. Third, having seen in Australia that a century of ranchers’ fires will polish off the last remnants of tropical dry forest—so much so that many Australian biologists had even come to believe that there never had been forest on those rolling grass plains dotted with fire-resistant eucalyptus trees

(Janzen 1988b, d)—we knew we had to act on behalf of Santa Rosa’s tropical dry forest...fast. Why?



With the removal of cattle—biotic mowing machines—from Santa Rosa in 1978 by SPN, the introduced Jaragua grass had made a 2-m tall solid mass of fuel. This fed ravenous fires that annually consumed trees and patches of forest that had survived for centuries in a delicate balance with the low-fuel fires on the closely cropped grass swards. Australia showed us unambiguously that if the anthropogenic fires were not eliminated, very shortly there would be no battered dry forest to conserve in Santa Rosa and no fragments from which to restore the forest. (There are no natural fires in the Santa Rosa region.)

A grass fire with its traditional dense flames 2-3 m high burning through ungrazed Jaragua (Sector Santa Rosa, 18 March 1987).

THE NEXT STAGE: FROM NATIONAL PARK TO CONSERVATION AREA

In the first two weeks of September 1985, Winnie and I generated an unsolicited strategic plan for the long-term survival of Santa Rosa’s dry forest through creating for it the psychological and sociological presence of owners, the “owners” being both its direct custodians and society near and far. Internationally it was called Guanacaste National Park or GNP (Janzen 1986c, 1988a) and became known in Costa Rica as the Proyecto Parque Nacional Guanacaste (PPNG). GNP had in its mission statement:

1. “Use existing dry forest fragments as seed to restore about 700 km² of topographically diverse land to a dry forest that is sufficiently large and diverse to maintain into perpetuity all animal and plant species, and their habitats, known to originally occupy the site. It also must be large enough to contain some habitat replicates that can absorb intense visitation and research use.”
2. “Restore and maintain this tropical wildland so as to offer a menu of material goods...and wildland biology





This top photo shows Bill Durham, today a professor of anthropology at Stanford University, in a Jaragua grass pasture in 1972, long before the elimination of anthropogenic fires (Cliff Top Regeneration Plot, Sector Santa Rosa, 25 July 1972).

data which will in turn be part of the cultural offering...”

3. “Use a tropical wildland as the stimulus and factual base for a reawakening to the intellectual and cultural offerings of the natural world; the audience will be local, national and international, and the philosophy will be ‘user-friendly’.”

Restoration of tropical dry forest, itself severely threatened and at that time virtually ignored in favour of the more spectacular “rainforest,” was the initial technical focus. It was clear that dry forest restoration on a large scale could not be achieved by planting trees, but rather by stopping the annual anthropogenic fires (pasture fires, with creeping fires in the litter of forest remnants) or lowering their impact until they could be eliminated.

Fire control required a break from classical national park management tradition. The PPNG hired, as an NGO rather than as a government agency, neighbouring residents to be staff dedicated to this single-minded purpose, and gave them the tools and administrative freedom to address the “no fire” challenge. They went right on doing what they had been doing all their lives on their own lands and jobs, which was to manipulate fire to manage vegetation. The progression was from guardaparques hating the smoke to “bomberos” (firemen and firewomen) exercising their professional ability.

Lowering fire impact required a break with the tradition of eradicating Human presence in a national park. During its first five years as PPNG, the to-be-restored-to-forest pastures were rented out as grazing land for as many as 7,000 cattle at one time. Their explicit purpose was to keep fuel loads so low that the nascent fire-control program could manage the occasional fire. As the tree load grew in the fire-free pastures, the less needed the

cattle were. They were later removed completely so as to protect the waterways that they so loved to trash (though a megafauna-free stream is hardly “natural”, see Janzen and Martin 1982, Janzen 1983b).

The concept of hiring residents and specializing staff for particular themes, which is an integral part of any university or corporation, was applied to all aspects of the PPNG cum ACG, not just to fire control. Thus we developed our own on-the-job-trained experts in fire control, research, police, biological education, restoration/forestry, ecotourism, administration, and maintenance. But the idea also brought a problem. While a well-trained ACG resident specialist feels on a quality career track (rather than on hardship duty to be tolerated as a short-term job assignment from the national urban centre), there are far greater costs of operation to support such a specialist. You don’t train a heart surgeon and then provide only a machete, running water, and a kitchen table. On a per staff basis (approximately 100 to manage 2% of Costa Rica), the ACG costs three to four times as much to operate as did the original Santa Rosa National Park (though the area under this “hands on” custody is ten times as large). With further biodevelopment as a quality conserved wildland, this cost will at least double.

But in 1985, forest restoration itself was a “new idea,” a departure from classical national park tradition, even though it was occurring serendipitously in parks throughout the world in which there had been some agropastoral activity before park establishment. In late 1985 and 1986, I received broad disapproval from international conservation NGOs for expounding a restoration focus. These NGOs were largely surviving on the fund-raising message of “help us save the tropical (rain) forest now before it is cut, because once cut, it is gone forever.” We



This bottom photo shows the pasture after 19 years of natural woody succession following the elimination of anthropogenic fires in 1980. Some of these trees will eventually be 25 m tall and live hundreds of years (Sector Santa Rosa, 25 April 1999)

were told that the donor public was not sufficiently sophisticated to be able to handle both a conservation and a restoration message. By 1987, however, management for conservation through restoration, alongside the conservation of old-growth tracts, became acceptable to both the donor and NGO communities, and this form of resistance largely disappeared internationally (though nationally it has its forms of persistence).

In the first five years of PPNG evolution, national approval was also essential. In 1986, Rodrigo Gámez, the biodiversity advisor to President Oscar Arias, led us to the new Minister Alvaro Umaña of the newly formed Ministerio de Recursos Naturales, Energía y Minas (MIRENEM) (today known as MINAE, or Ministerio del Ambiente y Energía). SPN had just moved from its original home in the Ministerio de Agricultura y Ganado (MAG). After hearing a half hour of description of the PPNG, Umaña had one question. Can it be done in four years? Innocently we replied that we thought it could be. That was our introduction to national politics. We thus had the government's blessing complete with the Presidential observation, "Sounds fine to me, but do not count on us for any funds." Our reply, innocent to be sure, was "Oh, that should be our responsibility."

Senior government approval was accompanied by a critical administrative step. Its necessity was self-evident to us, but we did not appreciate its administrative novelty. In 1986 the SPN, the Dirección General Forestal (DGF), the Dirección de Vida Silvestre (DVS), and the two reigning conservation NGOs (Fundación de Parques Nacionales, Fundación Neotropica) agreed informally (and with some legal wiggling) to allow all of their administrative responsibilities (and terrain) in the area of the PPNG to be pooled under one administration, one director, one site-specific staff, one work plan, and one budget. These entities were the formal owners of the State-owned lands and the newly purchased lands filling in the space between three national parks, one forest reserve, and one wildlife refuge. On site, Randall García, Roger Morales, Johnny Rosales, and Sigifredo Marín in succession have directed the PPNG cum ACG process, guiding this self-forming ship through shoals, low tides, storms, hurricanes, and wars. But always as one ship with one goal, and not as a fleet with many agendas, captains, and goals.

This ship, embarked on a journey of decentralization and horizontalization, was not eagerly welcomed by the centralized and verticalized administrative and social

structure that initially generated the excellent SPN raw materials and conservation spirit. We met with much the same experience as had occurred in Australia. Even as the PPNG was decreed the Unidad Regional de Conservación Guanacaste in 1989, and then later the Area de Conservación Guanacaste, as well as partly inspiring the formation of SINAC, its reception still vacillates between tolerance, welcome, and rejection. Constantly labeled as separatist and independent for pursuing site-specific sustainable and non-damaging ecosystem development, the ACG wends its weary and battle-scarred way towards the same stable state of decentralized and horizontal wildland conservation that is aspired to by Costa Rica's other conservation areas. Simultaneously it lives through the perturbations created by a government that is itself evolving from a highly centralist and state-oriented governance to a more entrepreneurial, decentralized, and circumstance-dependent governance by a daily more aware and educated populace. The nation-wide rush toward urbanization also creates no end of obstacles (and opportunities) for a conserved wildland area to gain recognition as a rural social institution, an equal at the table of cross-cultural negotiation rather than just one more field on the agroscape.

WHERE THE ACG IS TODAY

The ACG is far from having completed its evolution from a classical protectionist national park into a true conservation area. It still suffers pains of nascent decentralization, the last pieces of land are still being purchased, it still runs afoul of legislation created by other agendas for the agroscape and urbanity, and it labours with only faint praise from a society nurtured on a view of a national park as (pseudo) pristine nature. However, within the ACG, many things are now being done that will always be part of its negotiated peace with society.

The fires have been stopped, and 40,000 ha of old pastures have been flipped to young regenerating forest. Involved resident custodians balance their internal "protectionist" mission with the beginnings of a "production" mode that is compatible with their conservation mission. An endowment gives stability to staff and allows the application of performance-based employment criteria. Its elected board of directors (Comité Local) is drawn from the neighbouring resident communities and has survived through the waxing and waning of centralized approval and resentment. The ACG serves as a major platform for esoteric and applied research and development of wildland



biodiversity, and it is the classroom for basic biology classes for all kids within 20-30 km radius. Two percent of the country is, therefore, being managed and biodeveloped at almost no cost to the Costa Rican taxpayer. Needless to say, these things have been made possible because of a huge amount of support from national and centralized institutions and personalities.

Now several projects that integrate all aspects of the ACG into specific place-based actions are being conducted. These projects are similar to those of any institution that decides to conduct a specific project that simultaneously satisfies some portion of many different agendas. Here I briefly describe three of these sustainable-use projects, but I ask readers to remember that the ACG *as a whole* is also the sustainable use of a conserved wildland to generate the primary “product” – the act of keeping its biodiversity and ecosystems on Earth for the future.

Why the emphasis on use? Because society owns the world, and only accepts and keeps those portions that are useful to some degree to someone (Janzen 1998a). Winnie and I,



and you, may well invest our lives in the esoteric conservation of an area for biodiversity’s sake (thereby demonstrating its existence value to us as well as showing how we choose to contribute to the payment of that existence value). However, “our” energy is not enough to meet the bills, and a tenant who fails to pay the rent gets evicted. We do not aim for the pragmatism of “use” because we want to “make money” per se from wildlands, but because a wildland does need to pay its bills in one coinage or another. It may earn votes, payments for environmental services, or religious or aesthetic appreciation. But it must earn. It must meet its opportunity costs. The very fact that there are different coinages for different folks once again

emphasizes that *every* permanent conservation area is a place-based solution, paid in local currency, tailor-made to the circumstances, both biological and social. The staff and the strategy for any given conservation area must be oriented toward this social integration. There is no general recipe other than “conservation through non-damaging use,” though obviously any particular conservation area may well find a use for this or that tool that was created in some other conservation area. These three examples are offered as examples of specific tools, and as examples of process.

PROJECT ONE: THE ACG AS A BIODEGRADER OF AGROSCAPE WASTE

As mentioned in the 1985 mission statement, the ACG needed to be large enough to absorb Human activities as part and parcel of the survival of the conservation area and Human ownership presence. At least 20,000 ha of ancient pasturelands were purchased for this purpose, without knowing specifically what Human activities would occur on them as they gradually revert back to old-growth forest over the next thousand years. In 1992 the ACG suffered the very pleasant surprise of discovering that an industrial-level orange plantation was being established on thousands of hectares of low-grade ancient pastures along its northern boundary. To make a long story short, the ACG bet that among its 235,000 estimated species (Janzen 1996a) there would be some that would dearly love to eat orange peels.

In 1996 the ACG asked Del Oro for an experimental 100 truckloads to be dumped and leveled onto a centuries-old former pasture and former cashew orchard in the ACG. Within one-and-a-half years, the project yielded a deep black soil, elimination of the Jaragua grass, and a fine stand of multi-species broadleaf herbs—in short, an ideal substrate for forest regeneration. The ACG then negotiated a contract with Del Oro in which ACG organisms would degrade 1000 truckloads of peel a year for 20 years in the same manner (along with providing 20 years of other environmental services such as water, biological control, and environmental isolation). In return, Del Oro would pay the ACG with 1400 hectares of Del Oro forested lands

Here in 1990 six-year-old Maya Zumbado is learning about plant biodiversity development from Petrona Ríos, an ACG parataxonomist. Today Maya is a high school student and volunteer biologist at INBio in San Jose, and Petrona is part of a husband-wife-two children parataxonomist team that is conducting the plant and insect inventory of the rainforested Sector Pitilla of the ACG (Sector Santa Rosa, 30 Jun 1990)

contiguous with the ACG forests (Janzen 1999a, Blanco 1997, Jiménez 1998). It was hoped, and still is hoped, that once this agro-industry has exhausted its supplies of land to pay for these services, it will then pay in cash, cash that can in turn be used to meet many ACG needs.

The biodegradation of clean agricultural waste as a management tool in forest restoration/management is not novel (e.g., Harris 1992) and yet is a major step beyond the tradition of expensive fossil fuel-fed peel processing plants in some parts of the fruit industry. Once the details were understood, the Del Oro-ACG contract did not permanently raise eyebrows within the conservation and environmental management community. However, in a country that is environmentally and conservation-oriented at the level of heart-felt emotions, and whose populace is only lightly grounded in the science and engineering of the environment, this project became a revealing political controversy. It exposed as-yet-unresolved weaknesses in the ACG's sociological underpinning.

In constructing its juicing facilities, Del Oro had broken the fruit-processing monopoly in northern Costa Rica previously held by Ticofrut, another company. This set the stage for Ticofrut to take Del Oro to court for "sullyng a national park," quite irrespective that the ACG was the initiator and developer of the relationship. Given that an attack on the ACG is an attack on its Ministry, MINAE (and vice versa), the situation quickly escalated to become political rather than technical. The most recent stage involves Costa Rica's judiciary deciding that the project must be terminated and the orange peels removed on the grounds that there might be something wrong with the project. This is the same judiciary that would never dream of telling an individual farmer that he had to grow melons

instead of Carrots.

The irony is that the lands of the biodegradation site were purchased explicitly by the ACG for biodiversity use. Today, at no gain to the ACG, Del Oro is conducting its own peel biodegradation as a costly agricultural activity of formal composting just across the road from the ACG biodegradation site. The unique forest that was to be paid by Del Oro for the ACG's environmental services hangs in jeopardy. The current government is making an effort to re-establish the contractual relationship between MINAE and Del Oro in a format comfortable to the judiciary. The ACG is particularly anxious to once again receive massive amounts of biodegradable agricultural materials to hasten its forest restoration process (through soil improvement), facilitate the fire management process (through Jaragua grass elimination), and gain cash resources to meet other conservation needs.

However, this project illustrates that the centralized, biodiversity-naïve and ecosystem-naïve, urban national process has not yet come to be comfortable with a conservation area conducting its own management decisions in accordance with the needs of its wildlands, especially when those decisions smack of facts or ideas unfamiliar with whatever classical environmental awareness the urban centre carries. Breakdown ranged from a gross unwillingness by centralized urbanity to recognize ACG staff as anything other than janitors. They failed to understand that the staff of any conservation area is like the staff of a hospital. While it is important to have general system-wide goals and guidelines that reflect the commonality among hospitals, the staff has to have both the technical capability and the political authority to act specifically at the moment in the best interests of the patients and the community. Likewise conservation

These four photos, showing the biodegradation project in action, were all taken at exactly the same location: La Guitarra, Sector El Hacha, ACG. First, starting from the top, you can see centuries-old abandoned pasture filled with Jaragua and weeds (August 1987). The second photo shows the site with 1000 truckloads of processed (essential oils extracted) orange peels newly placed (January 1998). Third down is the site after activity by microbes and wild fly larvae (July 1998). The bottom photo shows the site in December 1999. Note, all Jaragua grass is gone and more than 90 species of herbs and woody plant seedlings are growing in a deep organic loam.



“doctors and nurses” must be able to act independently in the interests of biodiversity and the ecosystems within a conservation area. The centralized powers also didn’t realize that this piece of “State property” (a.k.a. national park) was in fact being managed to meet the financial and technical needs that the State had long ago abandoned. Even the discussion of this process, as presented here for the good of global biodiversity, is frowned upon.

But in sum, what is the significance of the orange peel biodegradation site in a conservation area? It proves that a wildland can conduct an environmental service for the agroscape and be compensated directly for it. It shows a wildland making use of management tools from the agroscape that are normally associated with “the enemy.” It illustrates the staff of a conserved wildland determining specifically what to do to increase the quality of the area’s biodiversity and ecosystem conservation. For the sake of forest restoration and wildland increase in this instance, the staff was using the tools at hand, rather than blindly responding to a passive and exclusionist tradition in wildland conservation. It is, in short, a win-win partnership between the conservation area and its agricultural neighbours, even if it is disruptive to the conservation image held by its more distant neighbours.

PROJECT TWO: THE ACG AS GMELINA FORESTER

It is no secret that Gmelina tree plantations, for fibre or cheap timber, are anathema to the tropical conservationist. The economics of Gmelina lends itself to the clearing of both old-growth and secondary successional rainforest. As well, Gmelina plantations directly block possible regeneration of wildland forests on old pastures and fields. However, like the agricultural waste mentioned above, Gmelina can also be a tool for the tropical conservationist. Abandoned pastures on former rainforest soils are notoriously slow to begin the rainforest regeneration process, even when there is forest nearby as a seed source and animals to move the seeds (e.g., the rainforest pastures in the eastern ACG, and see for example, Holl 1999, Holl and Kappelle 1999, Harvey and Haber 1999, Toh et al 1999, Janzen 1986d, 1988c, 1990, Aldrich and Hamrick 1998). This is in striking contrast to the rapid forest invasion of dry forest pastures when fire is stopped (if there are seed sources available). However, Gmelina planters are particularly fond of starting their plantations on old rainforest pastures. If not weeded, these plantations develop a dense shade-tolerant

understory of rainforest shrubs, vines and tree seedlings, dispersed there by vertebrates. The shade from the Gmelina canopy and understory weeds kills the pasture grasses. The phenomenon is well known to foresters, and has been thoroughly documented throughout the tropics with many species of plantation trees (Parrotta and Turnbull 1997).

To the rainforest restorationist, Gmelina (and sometimes, other species of plantation trees) therefore offers a self-financing tool. One simply purchases old rainforest farms and ranches to restore to rainforest by enlarging the area of existing old-growth and successful secondary succession. Now find a Gmelina planter and go into business. He or she pays the costs of the plantation, but does not weed it and eventually shares the harvest profits with the conservation area at some level. Instead of going into the second to the umpteenth rotation, after one 8-12 year rotation of Gmelina the planter pulls the logs and the conservationist herbicides the stumps. The unweeded understory is left to continue on upwards as a young rainforest.



Here is a six-year-old Gmelina plantation, with its extremely speciose native understory that can now be allowed to continue upward as rainforest restoration by killing or harvesting the Gmelina. The person in lower right corner is 1.5 m tall (Rincón Rainforest, 10 March 1999).

A grant from a conservation NGO has now put this concept into practice in the eastern ACG (project description available on request). It has generated resident employment and a sense of active construction, will generate gross agricultural production from the early stages of restoration for conservation, has minimal operations cost for the ACG, and may offer future gain for the ACG endowment.

Why, then, by a grant from an NGO? What commercial grower will invest in a project that will be subject to the political whim of a government to be elected two elections from now, when the time comes to harvest and sell the trees? Why invest in something that runs afoul of traditional national park legislation that dictated, for good reason in its time, “Thou shalt not commit commercial activity in a national park nor extract products from it”? Why touch something that runs afoul of national legislation restricting commercial activities on

State-owned land by government employees (irrespective of whether they are paid from the ACG's endowment) and violates policies forbidding a State agency to keep the proceeds from its activities? And why set yourself up for attack by a competitor who may want to damage you or the ACG for quite other reasons?

PROJECT THREE: ACG YELLOW PAGES

If the hundreds of thousands of wildland species in a large conservation area are to be used by society at large, and if the footprints left by that use are to be monitored and controlled to hold them within the “natural” ups and downs of wildland processes, then those species, and the ecosystems that contain them, need to be understood. They need to be understood at the species level for biodiversity services and at the ecosystem level for ecosystem services, and this understanding requires staff ecologists and taxonomists with knowledge management abilities, and it requires the knowledge itself (e.g., Janzen 1992, 1993b, 1996b, Janzen and Gámez 1997).

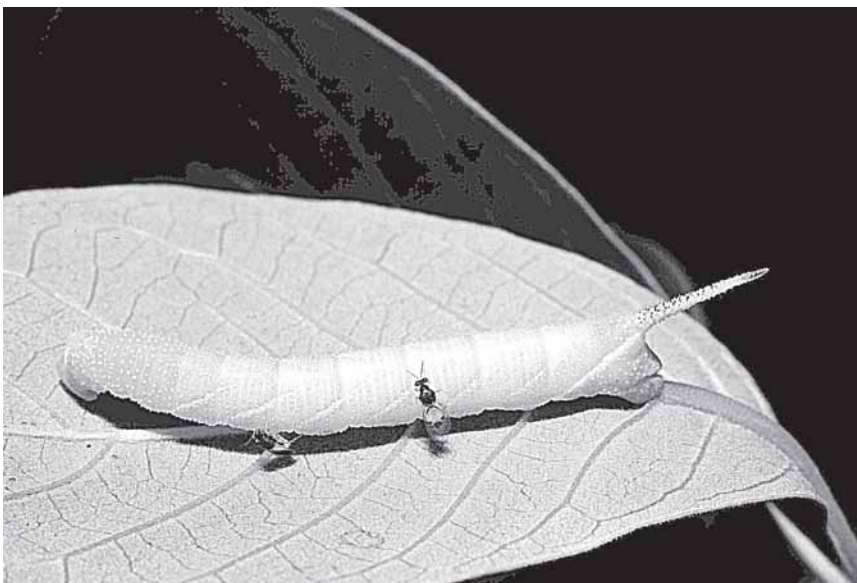
Fortunately, much of the information, and its management, can be handled through a combination of today's computerization and on-the-job “learning while doing.” Not every biodiversity manager has to spend ten years, and a half a million dollars, getting a Ph.D. and academic research experience. Instead the conserved wildland becomes an on-site graduate school. Costa Rica's parataxonomists and paraecologists (e.g. Janzen *et al* 1993) are living demonstrations of the success of this strategy and are now being emulated elsewhere in the tropics. (See <http://www.bishop.hawaii.org/bishop/natsci/ng/>

[ngpara.html](http://www.bishopmuseum.org/bishop/natsci/guyana/LOGGING4.HTM) and <http://www.bishopmuseum.org/bishop/natsci/guyana/LOGGING4.HTM> and Novotny et al 1998, Basset et al 1999.)

An on-going example of their work is the ACG plant Species Home Pages project at http://www.acguanacaste.ac.cr/paginas_especie/plantae_online/division. This project is financed at \$100,000/year by CRUSA (CR-USA Foundation), which pays for five resident parataxonomists and paraecologists (one person with a BSc degree, one student with three years of college, and three grade school graduates), their hardware and software, and their field operations costs. At the rate of 500-1000 species a year, their goal is to generate an electronic Yellow Pages for the estimated 6000-7000 species of ACG plants by taking pictures of the species, writing the descriptions, and posting them on the ACG web site. They want to set up all those plant species for use by everyone and anyone—clean taxonomy (strongly supported by efforts such as Species 2000 at <http://www.atcc.org/sp2000/> and INBio at <http://www.inbio.ac.cr>), micro-geographic distribution, basic natural history, and maybe most important of all, where to find the species (and how to know you have found it when you have). They are doing all this, on their own with no supervision, with what they are learning on the job and with what they learned formerly as parataxonomists, parabiologists, prospectors, research assistants, and bioadministrators. It is an “on-the-job-created” career in resident wildland biodiversity management, not something done as a student who then goes on to other things in distant societies. The real bonus is that these staff members come to know and understand “their” conservation area as only resident biologists do.

The ACG will heterogeneously conduct this kind of inventory for all of its organisms (e.g., see the caterpillar databases at <http://janzen.sas.upenn.edu>) thereby performing a global service, freely available over the Internet. Thus, this project is not just for the ACG or Costa Rica, but for all the conserved wildlands throughout the neotropics. A huge proportion of ACG species range from Mazatlan and Tampico in coastal lowland Mexico south to southeastern Brazil and

Two of more than 100,000 species of arthropods in the ACG; a caterpillar of *Manduca barnesi* being oviposited in by a parasitoid wasp *Euplectrus* (voucher 94-SRNP-4497 at <http://janzen.sas.upenn.edu>) (Sector Santa Rosa, 18 June 1994).



Bolivia. This concept was even cranked up as an All Taxa Biodiversity Inventory (ATBI), which would have performed the entire exercise as a seven-year white hot effort with coordination of resident, national, and international abilities (Janzen 1996a,b). However, that dream was cannibalized by national-level forces, which dictated that the resources were better spent spread on inventory throughout five other conservation areas.

Such biodiversity “inventories” are not exercises to determine where and what to conserve, though their information is clearly tools for those who confront such a challenge in those few parts of the world where we still have the luxury of such conservation planning. Rather, inventory is basic infrastructure for a multitude of expected and unexpected, passive and active management decisions, about both the internal processes and users from society. Sadly, such practical outcomes for biodiversity inventory seem to compete with the widespread academic desire to conduct biodiversity inventory as a *planning* exercise. Apparently, the ATBI process also conflicts with the “taxasphere’s” understandable desires to focus widespread study on a particular taxon wherever it occurs, rather than on “all” the diverse array of unrelated taxa at some particular area struggling for its conservation. Ironically, such decentralized, place-based inventory activity also receives attacks from centralized traditional academic universities, as well as centralized biodiversity authorities, both of which view decentralized biodiversity inventory efforts as competitively threatening their hegemony rather than an extension and expansion of their very legitimate centralized processes.

IN CONCLUSION

All of the above activities can be wiggled into an expanding concept of the ACG providing environmental services to resident, national, and international social sectors, along with the more traditional uses such as ecotourism, biodiversity prospecting, water production, biological control, research, education, etc. In all cases, the conservation area is being treated as an extremely complex garden that must be cared for by knowledgeable caretakers who focus on maintaining the highest quality biodiversity and ecosystem conservation into perpetuity. This high-quality ecological decision-making must be done in such a manner that the conservation area causes a social welcome rather than an allergic rejection. Any particular process may be a blessing or a curse, depending on the context of that particular place-based conservation project.

A major obstacle is that each entity touching on the conservation efforts of the ACG has its own agendas. In contrast to the permanent focus on a particular place, those agendas are generally process- or institution-based. It is as though everyone in the medical profession is good at healing a certain body part, and wants to apply his or her favourite procedure, but no one is concerned about the patient as a whole—and the patient is deaf, mute and blind. Nature is similar to a deaf, mute and blind patient; she does not come forth and ask us to be her doctors in the face of advancing Humanity. We must be proactive on nature’s behalf.

As I listen to different sectors of the conservation community approach the subject, it is quite startling to observe the repeated rediscovery of wheels long turning in other sectors of society. Conservation biologists, their academic biologist associates, and their government agency counterparts have long operated far from the standard stresses of cut-throat business competition, government regulation, legislation created by distant forces, protective tariffs, zoning, politics, etc. The forest does not hold grudges, hate your mother-in-law, or react to your passport.

While it is true that the narcissistic process of self-discovery swirling within the human anthill is a major motivator, we cannot afford the temporal luxury of thinking that an “ecosystem approach to sustainable use of biological diversity” is pioneering anything. Sustainable (and unsustainable) use of resources has been a trait of Human societies as long as they have existed - put the principle in the right place, live off some of the interest income, roll some over. This is the time for us “biologists” to form teams with those sectors that spend their entire lives on the investment and management frontier. Let’s ask them to apply their verbs to our nouns, and let’s be open to the few places where the unique traits of some of our nouns leaves room for the evolution of new verbs.

Two of the most serious obstacles confronting the conservationist facilitating the movement of a classically conserved wildland into a conservation area that is truly integrated with society are that a) society largely turns on the selective withholding of information (e.g., Janzen 1998a) and b) members of society are motivated by maximizing their inclusive fitness. For business people, in particular, that means managing their sector of society to make money—a very malleable “fitness” unit. Conservationists, on the other hand, measure much of their



Here are Roberto Espinoza, a resident botanist for the ACG, and Felipe Chavarría, a parabiologist, taking a break from collecting plants for an INBio-ACG biodiversity-prospecting project at Estación Cacao. Without the parataxonomist program, Roberto would be living a risky life on a small fishing boat, and without biodiversity prospecting, Felipe would be languishing in a customs warehouse in San Jose (25 March 1992).

fitness by the long-term survival of the particular wildland with which they are involved. So, when conservationists team up with business people to help their conservation area pay its bills and meet its opportunity costs, they throw themselves in with people whose traditions have a vastly different bottom line. Almost no business person, or business institution, sets aside some significant portion of earnings to facilitate the survival into perpetuity of the object bought or sold. Everything is for sale and anything can go bankrupt. This creates its traditions. When conservationists make a pact with



this devil, it needs to be a cautious and ephemeral pact. Biodiversity prospecting is, perhaps, the most recent example of the ephemeral nature of the pact between two partners with different goals. The technology of finding and using interesting molecules from wildland organisms (obviously possible, as many millennia of indigenous grandmothers and shamans have demonstrated) has been successful. However, the commercial practitioners' partners have their stockholders' decisions and their own bank accounts as the ultimate measure of success, rather than the survival into perpetuity of the conserved wildland from which the molecules came. The ACG conservationist is left with one option—we are pro bono negotiators on behalf of 235,000 species of unknowing and uncaring wee beasties and green lumps.

It is essential that society permit the conserved wildland to evolve and operate under a set of legislation and traditions that works best for *its* sustainable biodiversity and ecosystem development. This set will not be the same as what works best for the agroscape and its occupants. A huge portion of the current conflict between conservationists and the remainder of society comes from the attempt by the conservation community to impose on the agroscape what boils down to uncompensated zoning regulations. The dislike for this attempt is coupled with the lack of respect for the sovereignty of conserved wildlands by occupants of urbania and the agroscape. We need a peace treaty, much the same as the one the medical profession has developed with society, as it cuts, hacks,

probes, and drugs its patients into good health. As an unabashed advocate for the survival of tropical wildland biodiversity, I have no problem with “to-the-death” protection of large conserved wildlands while simultaneously relegating the wild and not-so-wild biodiversity of the agroscape to being yet one more tool in the agroscape’s toolbox. This agroscape biodiversity is certainly something to be understood and treated well, largely for very Human purposes, but whose ultimate survival is not the top priority for that land use. We need a peace treaty with society, and we need to get on with making

each kind of land use the top quality anthroecosystem that it can be.

It is the destiny of all conserved wildlands to be anthroecosystems—ecological islands carved out of a much larger anthro-ocean. As islands they are going to lose species until they come to some sort of equilibrium. They will be hotbeds of evolution and display place-based community structures other than that with which they started. Eventually they will settle into some sort of old-growth status that reflects not only their original composition, but also their particular overlay of climate changes, impeded migrations, altered water regimes, size, introduced species flow, edge effects, industrial contaminants, direct footprints, etc. Each island can go down a variety of different pathways as it moves to old-growth status. Many of these pathways offer opportunities for the conserved wildland to be welcomed by the neighbours (e.g., the orange peels and the Gmelina described earlier). Those islands fortunate enough to be allowed by society to reach old-growth status, whatever that may be, will be “grateful” that we made the effort.

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