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Costa Rica's Area de Conservacion Guanacaste: a long march to survival through non-damaging biodiversity and ecosystem development.

Daniel H. Janzen  
Department of Biology  
University of Pennsylvania  
Philadelphia, PA 19104  
[Djanzen@sas.upenn.edu](mailto:Djanzen@sas.upenn.edu)

## INTRODUCTION

A large conserved wildland non-damagingly developed for its biodiversity and ecosystem services is an anthroecosystem, much as is a large city with its agroscape and trade links. A large conserved wildland is, if it is to survive, by definition an "ecosystem approach for sustainable use of biological diversity", the theme of this conference. I view a conserved wildland as a somewhat disorderly garden, one that is multicropped, multitasked and has multiusers, and that produces its crops in unconventional kinds of sacks and boxes. And, it requires the same intensity of care and thinking as does any highly successful agroscape or urban center (Janzen 1998a, b, 1999a, b). Conservation into perpetuity demands the abandonment of the model of society fenced out and passive institutional custody.

The Area de Conservacion 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 eleven such conservation units at various stages of evolution in Costa Rica. Their sum covers about 25% of Costa Rica and constitutes the Sistema Nacional de Areas de Conservacion (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 is truly sustainable biodiversity 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 the impersonal "natural" elements and social forces.

There is no such thing as impersonal conserved wildland construction and survival into perpetuity. We have to move beyond the myth that a conserved wildland is a generic object

passively generated and maintained by bureaucratic national and international processes institutionalized in laws, regulations and bureaucratic structures. While these social constructs are necessary and useful technology, along with many kinds of technical information, they are no more sufficient than they are sufficient for the emergence and function of universities, corporations, medical systems, stock markets, wars, political parties, Internet, and other multi-personed social synergies. We must move to admission of the necessity for dedicated and self-interested staff for the institution called a conserved wildland, and sustain the cost of generating these kinds of personnel and giving them responsibility for all relevant processes. To do otherwise is as if we expected a hospital system or a university to simply appear on site because the land below its buildings has been purchased and guards have been hired.

## RELEVANT HISTORY OF THE ACG.

ACG history is deeply imbedded in social events, rather than being something carved out of seemingly pristine wilderness in a battle with an encroaching agroscape. A brief history tells much of why the ACG has developed its socio-economic conservation structure. The ACG is not an exercise in top-down biodiversity mapping of the kind fashionable among contemporary academic and international absentee custodial processes and organizations. It was born in the friction and flames of the evolution of a classical national park into a conservation area as a direct response to its biological needs coupled with those of the resident, national and international society in which it is embedded. When the ACG explores its biodiversity, it is for its development, and hence survival, rather than to find out whether it should be conserved.

The ACG's conservation process was set in motion in 1966. Kenton Miller (c.f., Miller 1980 and this volume) was then a young professor of natural resource management at IICA (Instituto Interamericano de Cooperación para la Agricultura) 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 ha surrounding the Casona, the ancient central ranch house for the original Hacienda Santa Rosa in northwestern Guanacaste Province. This vaguely defined ranch of about 100,000 hectares stretched from the evergreen-forested volcanos on the east (Volcán Orosí, Volcán Cacao) across a dry-forested coastal plain to the Pacific Ocean. Santa Rosa dates from the late 1500's, when it was established as part of a mule-production area for the Caribbean-Río San Juan-Lake Nicaragua-Rivas-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, croplands (rice, cotton, sorghum, garden crops, fruit and nut trees, etc.), and water for irrigation. Much of it was burned annually during the six-month dry season, the Interamerican highway was carved through its center in the 1940's, and jaragua pasture grass (*Hyparrhenia rufa*) was introduced from East Africa (via southern Costa Rica) about the same time. Santa Rosa was the second oldest ranch in Costa Rica and the Casona was the site of Costa Rica's two international battles. It was still a extensively managed cattle ranch in the mid-1960's when a major portion of it was expropriated from the Somoza family. Miller's management plans (Miller and von Borstel 1968) even argued that the area immediately around the Casona should be preserved as cultural heritage, with operating pastures, range cattle and cowboys. This was never realized because that was the very agroscape that Parque Nacional Santa Rosa was established to counter. The last free-ranging horses were removed in the early 1990's because they grew fond of eating things out of tourist tents and backpacks.

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. He recommended the establishment of Parque Nacional Santa Rosa (Executive Decree 1562-A in 1971) which came to replace the national monument (Law 3694 in 1966). Unconsciously, this classical national park establishment was an act of restoration biology. The vast area of "savannah" was in fact nothing more than introduced grass pasture and old fields, intermingled with many different ages of 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-1980's. As these agromanagement processes were gradually snuffed out in Santa Rosa, the dry forest gradually began its overall self-restoration from the multitude of fragments ranging 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, its original ecosystems altered beyond recovery.

Beginning in 1963, I was coursing the same landscape as a highly esoteric ecologist, exploring the incredible diversity of animal-plant interactions in Costa Rica's dry forests (e.g., Janzen 1967, 1974a,b, 1980, 1983, 1993a). Conservation was something done by Kenton Miller, Alvaro Ugalde, Mario Boza, the IUCN, the WWF, TNC, the Government - "those other people". I studied it, they saved it. Alvaro Ugalde and Mario Boza nursed the nascent Costa Rican Servicio de Parques Nacionales into its form in the 1970's and early 1980's 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", in a highly heterogenous race with an expanding population on a widening and intensifying agroscape.

Then in May 1985, Alvaro Ugalde, then the Director of Costa Rica's Servicio de Parques Nacionales, asked me as a friend from the days in the 1970's when he was the Director of Parque Nacional Santa Rosa, to do an environmental impact study of the 1500 gold miners that had invaded Parque Nacional Corcovado rainforests 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 and unrestrained people do as well to the adjacent rain forest. For the remaining six days we studied the gold miners, and we asked them to study themselves. The instant discovery was that they had concluded that it was legitimate doing something productive on "land with no owner" as defined by there being no social presence. This is, incidentally, the socio-political base for much "squatting" on formally titled lands in Costa Rica. We concluded that if the miners were told unambiguously that they were as if illegally parked, 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 that day X in March 1986 only 298 remained to symbolically arrested and pacifically removed.

Quite independently of the above, Australia's CSIRO asked me and my wife field biologist Winnie Hallwachs to spend August 1985 in northern and northwestern Australia, thinking with them as to "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 administrated 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 the New World in September 1985 realizing two things. First, we had never asked the question for Santa Rosa that CSIRO put to us. Second, we had not had the foresight to realize how critical is social presence for wildland conservation, until confronted with the moral conclusion reached by Corcovado's gold miners. Society honors ownership in many ways, wars not withstanding. However, its ownership needs to be psychologically and sociologically visible if a conserved wildland to remain conserved.

We also returned at a time when Costa Rica's national economy had taken a severe hit through a global drop in coffee prices (at that time, and for decades before, a major source of Costa Rica's international purchasing power), a drastic rise in fossil fuel prices (Costa Rica has no fossil fuel), and the beginning of the decay of the Guanacaste Province cattle crop (in Costa Rica, by the mid-1990's, reduced to only a very pale shadow of what it was for two decades before). Along with many other government programs, the Servicio de Parques Nacionales 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.

And we returned from Australia having seen 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). With the removal of cattle - biotic mowing machines - from Santa Rosa in 1978, the introduced jaragua grass made a 2-m tall solid mass of fuel, creating 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 without elimination of the anthropogenic fires (there are no natural fires in the Santa Rosa region), very shortly there would be no battered dry forest to conserve in Santa Rosa and no fragments from which to restore the forest.

#### 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 at once both its direct custodians and society near and far. It was called Guanacaste National Park or GNP internationally (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 km<sup>2</sup> 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 a tropical wildland so as to offer a menu of material goods...and basic wildland biology 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 favor 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, neighboring residents as staff for this single-minded purpose, give them the tools and administrative freedom to themselves 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 firemen exercising their professional ability.

Lowering fire impact required a break with the tradition of eradicating human presence in a national park. The ACG, during its first five years as PPNG, rented out its to-be-restored-to-forest pastures to as many as 7,000 cattle at one time. They were biotic mowing machines on the newly acquired ranchlands. 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 cattle were later removed so as to protect the waterways 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 (fire control, research, police, biological education, restoration/forestry, ecotourism, administration, maintenance), an integral part of any university or corporation, applied to all aspects of the PPNG cum ACG as well as it did to fire control. But it brought a problem. A well-trained resident specialist not only feels on a quality career track (rather than on hardship duty to be tolerated as a short-term job assignment from the national urban center), but also has far greater costs of operation. 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 3-4 times as much to operate as did the original SRNP (though the area custodianized is ten times as large). With further development as a quality conserved wildland, this cost will at least double.

But forest restoration itself was also a departure from classical national park tradition in 1985 (though it was occurring serendipitously in parks throughout the world, parks where there had been some agropastoral activity before park establishment). Dry forest restoration was widely viewed as a "new" idea when stated explicitly for the formation of a national park (while it has been the subject of academic study under the rubric of "succession" for many decades). In late 1985 and 1986, I received broad disapproval from conservation NGOs for expounding a restoration focus. These NGOs were largely surviving on the fund-raising message of "help us national-park-ize tropical (rain) forest now before it is cut, because once cut, it is gone forever". We 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 community, 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 needed. In 1986, Rodrigo Gamez, 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. The government blessing was thus received complete with the presidential observation of "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".

This laying on of senior government approval was accompanied by a critical administrative step. Its essentiality was self-evident to us but we did not appreciate its administrative novelty. In 1986 the SPN, the DGF (Dirección General Forestal) and the Dirección de Vida Silvestre (DVS), and the two reigning conservation NGOs (Fundación de Parques Nacionales, Fundación Neotropical) 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. Randall García, Roger Morales, Johnny Rosales and Sigifredo Marín in succession have directed the PPNG cum ACG process, on-site 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 n 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. Even as the PPNG was decreed the Unidad Regional de Conservación Guanacaste in 1989, and then later the Área de Conservación Guanacaste, and then part of the inspiration for the formation of SINAC, its reception 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 desired by Costa Rica's other conservation areas. Simultaneously it lives the perturbations created by a government itself evolving from highly centralist and statist command and control to more entrepreneurial, decentralized, and circumstance-dependent governance by a every-day 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 IS THE ACG TODAY: THREE ILLUSTRATIVE PROJECTS.

I have hinted at the 14-year evolution of the ACG out of a classical protectionist national park. The ACG is far from having completed this first stage. It still suffers pains of nascent decentralization, is purchasing its last pieces of land, runs afoul of legislation created by other agendas for the agroscape and urbanity, and labors without praise from a society nurtured on a view of a national park as (pseudo)pristine nature. However, the ACG is now doing many of the things that will always be part of its negotiated peace with society.

It has stopped its fires. It has flipped 40,000 ha of old pastures to young regenerating forest. It has staffed itself with self-perpetuating and involved resident custodians who balance their internal "protectionist" mission with the beginnings of a "production" mode

compatible with their conservation mission. It trains itself for the challenge at hand, as well as confronts challenges it was trained to expect. It teaches basic biology to all school children in a 20-30 km radius. It has built and managed an endowment that gives stability to staff and allows the application of performance-based employment criteria. It has created its own elected board of directors (Comite Local) drawn from the neighboring resident communities, and kept this alive through the waxing and waning of centralized approval and resentment. It serves as a major platform for esoteric and applied research and development of wildland biodiversity. And it manages and develops 2% of the country at almost no cost to the Costa Rican taxpayer. Needless to say, it has done these things with a huge amount of support from national and centralized institutions and personalities.

It is now beginning to conduct projects that integrate all aspects of the ACG into specific place-based actions, as must 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 projects in non-damaging sustainable use of a conserved wildland, while recognizing that ALL of the ACG as a whole is also the sustainable use of a conserved wildland (including the "product" 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. 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 how we contribute to the payment of that existence value). However, our, and your, energy is not enough to meet the bills. The 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 as a matter of fact. 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.

#### I. THE ACG AS A BIODEGRADER OF AGROSCAPE WASTE.

As mentioned in the 1985 mission statement for the ACG, it needed to be large enough to absorb human activities as part and parcel of the survival of the conservation area and human ownership presence. Many 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 wend their multiple ways back to old-growth forest 1000 years from now. 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 her 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 1.5 years, the result was a deep black soil, elimination of the jaragua grass, and a fine stand of multi-species broadleaf herbs, an ideal substrate for forest regeneration. The ACG then negotiated a contract with Del Oro for its organisms to degrade 1000 truckloads of peel a year for 20 years in the same manner, with Del Oro paying explicitly in

the coinage of 1400 hectares of their forested lands contiguous with the ACG forests for this environmental service (along with 20 years of other environmental services such as water, biological control, and environmental isolation) (Janzen 1999a, Blanco 1997, Jimenez 1998). It was hoped, and still is hoped, that once this agroindustry has exhausted its supplies of land to pay for these services, it will then pay in cash, cash that the ACG can in turn use to meet its many needs.

This biodegradation of clean agricultural waste as a management tool in forest restoration/management is in fact not novel (e.g., Harris 1992) and is a major step beyond the tradition in some parts of the fruit industry of expensive fossil fuel-fed peel processing plants. Among Costa Rica's conservation and environmental management processes the Del Oro-ACG contract did not permanently raise eyebrows once the details were understood. However, in a country that is very 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 very revealing political controversy. It exposed as-yet-to-be resolved weaknesses in the ACGs 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 set in motion the processes 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 is that of 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, a 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, and today Del Oro conducts its own peel biodegradation as a costly agricultural activity of formal composting just across the road from the ACG biodegradation site, at no gain to the ACG. And the unique forest that was to be paid by Del Oro for the ACG's environmental services hangs in jeopardy. Hopeful steps are being reinitiated by the current government to reestablish the contractual relationship between MINAE and Del Oro in a format comfortable to the judiciary. The ACG is particularly anxious to be able 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, it is clear that a 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 the whatever classical environmental awareness the urban center carries. Breakdown ranged from a gross unwillingness by centralized urbanity to recognize ACG staff as anything other than janitors, to a lack of understanding that this piece of "State property" (a.k.a. national park) was in fact being managed by financial and technical needs that the State had long ago abandoned. Even the discussion of this process, as presented here for the good of this conference and global biodiversity, is frowned upon.

The staff of a conservation area is in effect like a staff of doctors, nurses and technical support responding to the particular emergency and chronic medical needs of the neighborhood of a particular hospital. General system-wide goals and guidelines reflecting the comunality among hospitals have their function, but the staff has to have both the



technical capability and the political authority to act specifically at the moment for the best of the patients and the community.

But in sum, what is the significance of the orange peel biodegradation site in a conservation area? It is a wildland conducting an environmental service for the agroscape and being compensated directly for it. It is a wildland making use of management tools from the agroscape and normally associated with “the enemy”. It is a conserved wildland determining specifically what to do to increase the quality of its biodiversity and ecosystem conservation (forest restoration and wildland increase in area) by doing what is specifically needed with 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 neighbors, even if it is disruptive to the conservation image held by its more distant neighbors.

## II. THE ACG AS GMELINA FORESTER.

It is no secret that gmelina plantations, for fiber or cheap timber, are anathema to the tropical conservationist. The economics of gmelina lends itself to clearing of both old-growth and secondary successional growth, as well as to the direct blockage of 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, it so happens that 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 grass. The phenomenon is very 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 other species of plantation trees) offers a self-financing tool. Purchase old rainforest farms and ranches to restore to rainforest to enlarge the area of existing old-growth and successful secondary succession. Find a gmelina planter and go into business with him. He pays the costs of the plantation. However, he does not weed it. Share the profits with the conservation area at some level. Instead of going into the 2nd to nth rotation, after one 8-12 year rotation of gmelina he pulls his logs and you herbicide the stumps. Leave the unweeded understory to continue on upwards as a young rainforest.

A grant from a conservation NGO has now put this concept into practice in the eastern ACG (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 NGO grant? What commercial grower will invest in a project that he knows is subject to the political whim of the 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 for attack by a competitor who wants to damage you or the ACG for quite other reasons?

### III. A BIODIVERSITY YELLOW PAGES FOR THE ACG.

If the hundreds of thousands of wildland species in a large conservation area are to be used by society at large, and 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 at the species level for biodiversity services and at the ecosystem level for ecosystem services. This requires staff ecologists and taxonomists with knowledge management abilities, and it requires the knowledge itself (e.g., Janzen 1992, 1993b 1996b, Janzen and Gamez 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". We do not have to have every biodiversity manager spend ten years and a half a million dollars getting a Ph.D. and research experience. The conserved wildland becomes an on-site graduate school. Costa Rica's parataxonomists and paraecologists (e.g. Janzen et al 1993), now being emulated elsewhere in the tropics as well, are living demonstrations (see <http://www.bishop.hawaii.org/bishop/natsci/ng/ngpara.html> and <http://www.bishopmuseum.org/bishop/natsci/guyana/LOGGING4.HTM>, and Novotny et al 1998, Basset et al 1999).

An on-going example is the ACG plant Species Home Pages project ([http://www.acguanacaste.ac.cr/paginas\\_especie/plantae\\_online/division.html](http://www.acguanacaste.ac.cr/paginas_especie/plantae_online/division.html)). This project is financed at \$100,000/year for five resident parataxonomists and paraecologists (one BS degree, one 3 years of college, and three grade school graduates), and their hardware and software and field operations costs. Their goal is to generate on the ACG web site, at the rate of 500-1000 species a year, what boils down to an electronic Yellow Pages for each of the estimated 6000-7000 species of ACG plants. They take the pictures, they write the descriptions, they put it all on their web site. Their goal is 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/>), microgeographic distribution, basic natural history, and maybe most important of all, where to find one (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, parabiodiversity prospectors, research assistants, and bioadministrators. It is an "on-the-job-created" career in resident wildland biodiversity management, not something done as a student to go on to other things in distant societies. And these staff members come to know and understand "their" conservation area as only can resident biologists.

The ACG will heterogeneously conduct this kind of inventory of 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, not only for itself 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 Bolivia). This concept was even cranked up as an All Taxa Biodiversity Inventory (ATBI) to perform the entire exercise as a 7-year white hot effort with coordination of resident, national and international abilities (Janzen 1996a,b). However, that dream was cannibalized by national level forces that dictated the resources were better spent spread on the same kind of effort throughout five other conservation areas.

Such biodiversity “inventories” are not exercises to determine where and what to conserve, though its information is clearly a tool 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 process and users from throughout society. Sadly, such inventory has been viewed internationally as a process competing with the widespread academic desire to conduct biodiversity inventory as a planning exercise, and even to conflict with the taxosphere’s very 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, who 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. It must have very knowledgeable caretakers focused on the end goal of maximum quality biodiversity and ecosystem conservation into perpetuity. This must be done in such a manner that the conservation area causes a social welcome rather than allergic rejection.

A major obstacle to achieving these agendas is that each entity touching on conservation has its agendas, but those agendas are generally process- or institution-based rather than place-based, focused permanently on some particular place to be conserved. It is as though everyone in the medical profession is good at something, but no one is concerned about a given patient as a whole – and the patient is deaf and mute. Nature does not come forth and ask us to be its doctors in the face of advancing humanity. We must be proactive on nature’s behalf.

As I listen to different sectors of conservation approach the subject matter of this conference, it is quite startling to observe the repeated rediscovery of wheels long turning in the 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 or hate your mother-in-law. Self-rediscovery of the narcissistic processes swirling within the human anthill brings its own rewards. However, we cannot afford the temporal luxury of having an “ecosystem approach to sustainable use of biological diversity” think that it is pioneering anything. Sustainable (and unsustainable) use of resources has been a trait of 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. Ask them to help apply their verbs to our nouns, and to be open to the few places where the unique traits of some of our nouns leaves room for the evolution of new verbs.

This is perhaps the place to mention what is to me one 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. Society largely turns on the

selective withholding of information (e.g., Janzen 1998a) and members of society are motivated by maximizing their inclusive fitness. Money is a very manipulatable fitness unit. Conservationists measure much of their fitness by the long-term survival of the particular wildland they are involved with. When conservationists team up with “normal” people who manage a sector of society to create those manipulatable fitness units called money, so as to help their conservation area pay its bills and meet its opportunity costs, they throw themselves in with traditions with a different bottom line, or at least one measured in a different coinage. Virtually 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. 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 – its failure for conservation hinges not on the technology of finding and using interesting molecules from wildland organisms (obviously possible, as many millenia of indigenous grandmothers and shamans have demonstrated), but rather that its commercial practitioners have their stockholders’s 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.

This reflection brings to mind that it is essential that society permit the conserved wildland to evolve and operate under that set of legislation and traditions that works best for ITS sustainable biodiversity and ecosystem development. These 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 derives from the attempt by the conservation community to impose on the agroscape what boils down to uncompensated zoning regulations, coupled with the occupants of urbania and the agroscape being unwilling to respect the sovereignty of conserved wildlands. We need a peace treaty, much as the medical profession has developed with society, as it cuts, hacks, probes and drugs its patients into good health. As an unabashed advocate of tropical wildland biodiversity survival into perpetuity, 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 – 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 - be they round, long and thin, or wiggles. As islands they are going to lose species until they come to some sort of equilibrium, be hotbeds of evolution, display place-based community structures other than that which they started with, and eventually 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. In arriving at old-growth status, each island can go through a variety of different pathways. Many of these pathways offer opportunities for the conserved wildland to be welcomed by the neighbors (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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