SUPPLEMENTARY TEXTS FOR

Our Once and Future Planet

Restoring the World in the Climate Change Century

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The Janzen/Hallwachs Recipe for a Restored and Durable Wildland Garden

Paddy Woodworth

From interviews with David Janzen. Linked to Chapter 10, "Restoration on a Grand Scale," of *Our Once and Future Planet*.

First get your garden

"Raise funds to buy terrain off the market and give the ecosystem back to the wild things to duke it out among themselves…Generate the endowment funding so that the site managers have the operations (and job security) budgets to do the management required for [non-damaging] biodiversity development and integrated dancing with the remainder of society."[1]

Integrated dancing with society? What's that mean?

"If you want anything to survive in a human community, you have got to weave it into how that human community runs itself."[2]

"The key sociological practice was to gain social acceptability for the [ACG] project locally, nationally and internationally."[3]

"The single most critical resource for tropical restoration (and for conservation as well) is social desire to build the wildland back into the agroecosystem's mind, heart and pocketbook"[4]

"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.[5]

Hire some of the former users as live-in managers…The challenge is to turn the farmer's skills at biomanipulation to work for the conservation of biodiversity. Explicit and public agreement on management goals is imperative. Is the goal a low-overhead zoo, botanical garden, gene bank, functioning watershed, teaching laboratory, or some combination of these and other goals? Agreement is particularly critical in freewheeling tropical frontier societies, where ownership and administrative responsibility for public goods are poorly defined."[6]

"We have long been misled by the view that tropical peoples care only about their stomachs, not the "luxury" of baubles like national parks. Choose a community of 300 subsistence farms anywhere in the tropics, purchase three adjoining farms, turn them into a public conserved wildland, give it back to the community, and you will get 280 votes favoring its presence and permanence."[7]

Education is central to the success of restoration.[8]

"The natural world is by far the most diverse and evocative intellectual stimulation known to humans. Tropical humans are experiencing nearly total loss of this integral part of their mental lives. It is as though they are losing their color vision and most of their hearing. Ten thousand acres of rice is one of the dullest habitats on earth. The level of human intellectual deprivation represented by the upcoming obliteration of tropical wildlands is the terminal step in what has been many consecutive generations of gradual biocultural loss to tropical humanity. It strands the school-children of a tropical town without either their predecessors' contract with the natural world or the cultural offerings of the large cities that are supported by their parents' agriculture. It is critical that diverse and imaginative education programs be taught within the restoring wildland, and local peoples be intellectually involved in the restoration and

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management process. To save what is restored, the doors of the library must be open very wide. Yes, some books will be stolen, lost, worn, incorrectly shelved, and unappreciated. That is the tax that a conserved wildland must pay for survival in tomorrow's tropics."[9]

You don't—always—need to do pro-active restoration.

"The key management practice was to stop the assault—fire, hunting, logging, farming — and let the biota re-invade the ACG."[10]

Author note: the above view, very strongly stressed in Janzen's and Hallwach's early work, was heavily influenced by case-specific experience with dry tropical forest in the Santa Rosa sector of the ACG. As we have seen, different soil conditions in neighbouring Santa Elena make spontaneous dry tropical forest regeneration much slower and more problematic, though not impossible. More recently, Janzen and Hallwachs have not been shy about taking a much more interventionist approach when circumstances demand it. They have used daring manipulation techniques—gmelina as nurse tree in rainforest, orange pulp as restoration accelerator in dry forest. However, Janzen does not grant that there is a major qualitative difference between his earlier and later restoration techniques:

"Those [gmelina and orange pulp strategies] are simply the application of ordinary ages-old biology to solve a local technical problem to speed the restoration process (give it back faster, thereby lowering the chance of something going [locally extinct] in the meantime) and simultaneously give one of many possible products to the society with which we are wedded."[11]

Restoration techniques are always place- and case-specific

"The details of constructing any wildland garden--the application of concepts--are

guided and frameworked by the details of the site, its ecology, and its society. Fire is a disaster here, essential there. Reintroduction is right here, wrong there. People can walk all over this, stay out of that. Sometimes a scalpel is called for, sometimes a bulldozer. What matters is the goal of wildland survival into perpetuity—the specific actions are place-based, time-based, society-based."[12]

"One shirt does not fit all, by any means."[13]

"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."[14]

Do you need a reference system for restoration in systems as richly biodiverse as those in the ACG?

"Restoration of the ACG is not a succession guided to a specific target that mimics some remnant old-growth forest, but rather a naturally-occurring succession toward whatever it will become."[15]

During our interview, Janzen qualifies this position to a degree, but his analysis reflects both the complexity of the specific ecosystem in Santa Rosa, and broader issues about the impossibility of 'carbon-copy' restoration. He agrees that the old-growth patch of forest in Santa Rosa is "a reference system, in macrocontext, big trees, shady, climate amelioration, lots of species packed into one spot—if you take those broad-sweep statements then yes, that is a reference, in a thousand years there will be big trees everywhere…But as soon as you graduate down to details—list of species, growth rates, replacement rates and so on—all those variables shift from place to place, soil types, exposure, long-term history, accidents of what species are there, what proximity to the ocean, there is a whole series of variables, each one of which would create a different reference collection, a different reference point, and most of those are gone completely, so we can only approximate what has happened in the past."

What trajectory should you expect?

"The ACG is landscape-level restoration of a large wildland island in an ocean of agroscape. It was way too expensive, and biologically dubious, to invest in processes to attempt to return any given hectare to some particular species composition."[16]

Why 'biologically dubious?'

"Seed shadows and the intensity of seed rain will be created by the serendipity of parental proximity to the site, vagaries of animal survivals in this highly 'artificial' circumstance, ethnocentricities of directed animal and plant harvest by residents for previous centuries, serendipitous susceptibility to fire, herbicides, and soil contaminants, etc. The outcome is that two equal-aged adjacent regenerating pastures of the same size on the same soil can have grossly different plant species compositions and attendant different animal communities."[17]

"All you can do is take a photograph of what comes to be and say 'ok, this is.' "[18]

Is the purpose of restoration/conservation the preservation of all species appropriate to the site?

"I come from an ecology where I am interested in how things interact, period, and if they interact such that one of them wipes the other off the map that doesn't grate on my psychology and so I am much inclined to say that I'll do what I can do, to let the native organisms beat on each other and come out with some consequence, and, whatever that consequence is, I am happy with that."[19]

"I am real callous about what other people think nature ought to be. I view it almost entirely as their feeding their own agendas. I am real happy to have trees beat on each other and animals eat each other, and some push populations down and some populations expand, let's just see what happens, I am real cool with that."[20]

"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."[21]

Hotbeds of evolution? How's that? Doesn't fragmentation lead to the *loss* of evolutionary processes?

"If one were to set out to create a swarm of sibling species, the way to do it would be to fragment one of the hundreds of thousands of species that are distributed from Mexico/Mesoamerica down into South America, and occupy many ecosystems. By erecting oceans of agroscape isolating fragments of these ecosystems, we are creating hundreds of small to medium-sized populations. Each will occupy a somewhat different set of ecological circumstances, each of which is more uniform than the area occupied by the once-widespread population. Speciation will occur. This is the destiny of the species in most small tropical conserved wildlands, even though some of the larger ones, like the ACG, will have substantial ecosystem and habitat diversity within them. Restoration biology may recreate wildland islands, or allow some fragments to coalesce, but it will not eliminate the massive species-generation process set in motion by fragmentation of once-widespread populations."[22]

That sounds quite futuristic. Can you restore to the past?

"Sorry, you had to be here 9,000 years ago in order to have played that game because then we exterminated the mastodons and our whole package of megafauna."[23]

Can we not find surrogate species to substitute for the megafauna?

"The horse was the gift of the Spaniards to us from the Pleistocene. [*Janzen argues, in a famous and controversial paper,*[24] *that significant Central American trees, including*

the guanacaste, evolved seed-distribution traits through interaction with large Pleistocene animals, and that their ranges therefore contracted drastically when these animals, including the native horse, were extinguished. This theory offers us the challenging scenario that mixed dry forest/grassland systems today, patchily grazed and browsed by introduced horses and other livestock, may be closer in structure to the equivalent Pleistocene landscape than to that which the Spaniards found on their arrival]. The horse got parked in Europe for 9,500 years. Now if somebody found a giant ground sloth today, everyone would go mad to have it in their national park. And that should be our attitude to horses, too. But then you think, 'oh, but we don't have

that should be our attitude to horses, too. But then you think, "oh, but we don't have sabre-tooth cats to go with them, and if you turn the horses loose you have to castrate them or shoot them [to control their population] and nobody likes shooting horses, so it goes round and round.'"[25]

What role, then, does triage play in restoration?

"Accepting triage is perhaps the most painful requirement of tropical restoration; a thousand hectares of restored tropical forest will sustain thousands of species of insects, plants and other small organisms but it will not sustain a white-lipped peccary population no matter how many times it is introduced. Triage is critical so as to get scarce resources focussed on particular sites and not to ladle funds onto the living dead[26] for nostalgic reasons."[27]

What indications are there of winners and losers in this triage process in the ACG?

"Some [species] are decreasing, because they did well under heavy human perturbation, like the mountain lion, which will be down to 1 per cent of what it is today 1000 years from now.[28]

However, the jaguar, much more threatened than the mountain lion right across its range, will "increase with restoration" in the ACG.[29]

"Many species of moths were very common when the ACG was a mosaic of secondary forest and grazing swards. Their density has plummeted during 15 years of restoration…In the oceans of ACG secondary successional forest, many species of ACG butterflies and birds are much less visible today than they were in 1985. The white-tail deer, much appreciated by the public, will become rare almost to extinction in the ACG dry forests as the decades pass.[30]

"Restoration is generally homogenizing the habitat diversity within the ACG pasture-forest mosaic[31], but it is expected that new and currently invisible patterns of habitat diversity will appear in the eventual old-growth forest cover.[32]

Should the ACG be used as a sanctuary to save non-native species from extinction?

"It is tempting to view the few large conserved Mesoamerican wildlands, all undergoing restoration, as potential Noah's Arks for species threatened with extinction elsewhere. Species occurring in other Mesoamerican dry forests, for example, could be introduced into the ACG and probably maintain 'normal' populations there. Since the bulk of the entire ACG biota came from elsewhere… it is very hard to argue against such a rescue mission. Whether it would result in the extermination of resident species is unknowable. This proposes the yet more subjective question of which species was indeed more 'important' to keep.[33]

Janzen has argued that his scientific peers spend too much time collecting data and too little time conserving ecosystems. Yet he and Hallwachs have invested a great deal of time and not a little money in setting up a network of 'parataxonomists,'[34] involved in a vast and innovative taxonomy project at the ACG. Why?

"If you don't know what you're looking at, then the tendency is to think of it as just a lot of green trash," he says. "People treat nature the way you would if you were illiterate and saw a library as a big stack of firewood."[35]

"If we do not know it exists, then for certain we won't keep it."[36]

"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 and management abilities, and it requires the knowledge itself… 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…now being emulated elsewhere in the tropics as well, are living demonstrations [of how to do this].[37]

"This is descriptive science, like Audubon with his shotgun, as opposed to ecology based on elegant responses to carefully constructed questions."[38]

Janzen and Hallwachs profess little interest, and less love, for many aspects of humanity: "I don't want to call us wild animals, but we are all our lives, in one way or another, divorced from societies…humans are a pretty boring animal…nature has become our friend because it became the thing we related to and gave us satisfaction."[39] Yet they have consistently demonstrated a razor-sharp awareness of how human societies function. They are embedded in the most influential US and international philanthropic, academic, and conservation networks. They play politics at a national level in Costa Rica. Most of all, they are fondly engaged with the complex and intimate human world of Guanacaste province. Are these not contradictions?

"Yes, but my hyper-awareness [of human society] is not to become a member of society, it is purely manipulative; clearly if I am going to have you as a partner, or those six people over there, in achieving this end over here, I have to understand your agenda. I have to, because the only way I can get you to behave the way I would like you to behave is if I can load the agenda so that your agenda intersects with my desire to let nature do its thing. Whereby you, by letting nature do its thing, get something you want, then you will put your shoulder to it with the other people…humans are never going to let nature have the world back, but if some part of you can be fulfilled by having nature out there, then there is some chance that there are still going to be some little pieces of nature left."[40]

"We learned this as any ecologist would, by studying the animals around us called *Homo sapiens*, but we did not always get it right, we did not always understand what they were doing."

But is that the whole story? I can't help feeling you have quite a passion for Costa Ricans, and especially for poorer people who live close to the soil…and that you find that it exciting and moving that you have been able to involve them in your projects?

"Yeah, but you have got to recognise that, in a hard cold way, we have found a part of a society—it could have been in Papua-New Guinea, it could have been in Guatemala, or wherever—that is sufficiently squashed by other forces in society, that if you provide them with a porthole out of which to escape, the energy of that escape is something I can harness to this project, so that it becomes a driver, like a powerful vehicle. Then we achieve things I could never achieve with society as a whole."[41]

"Now if you look at *us* coldly, as some people do, you could say, 'hey Dan, you are exploiting those working class people,' and I am, we are exploiting them. But I like to think, in my own defence, of this as a positive kind of exploitation."[42]

To which Hallbachs adds, clarifying, smoothing out wrinkles: "What does not come out in your way of putting it is that we did not just study people, we also talked to people a lot, we listened…"[43]

Would you then recognize that what the ACG is doing with the parataxonomists, with the park staff generally, and with the surrounding society, especially through your extensive and intensive education programs with schoolchildren—in short, what you have called biocultural restoration—could be described as the restoration of social capital?

"I would not use those words, or say it is my target. I would say that the act of doing it this way creates a better ecological climate, and, because, having done this, there are social forces in the community and at a national level such that you get a political green light to do this. It is a way of achieving permission from society to do this. And you are creating jobs and training their children and doing these school things—notice we pay the bill for the school program, they don't pay the bill for it. To put it bluntly, you are buying friendship for the wildland. But Christ, all societies do this: I give you one duck and you give me one chicken, because I have ducks and you have chickens.[44]

NOTES

1. BACK E-mail from Daniel Janzen to James Aronson, square bracket is an amendment by Janzen, e-mail to author, 23 May 2011
2. BACK Daniel Janzen, interview with author, Santa Rosa, January 9, 2010.
3. BACK Daniel H. Janzen, "Tropical dry forest: Area de Conservación Guanacaste, northwestern Costa Rica," in *Handbook of Ecological Restoration*, Volume 2, Restoration in Practice, eds. M.R. Perrow and A. J. Davy, (Cambridge: Cambridge University Press, 2002). Janzen, personal communication, January 5, 2011. This included his own electronic version of "Tropical Dry Forest," prefaced by an abstract not included in the published version, but which he has widely circulated. The quotation is from this abstract, pt 9.
4. BACK Daniel H. Janzen, "Tropical and Biocultural Restoration," *Science* 239 (1988): 244.
5. BACK Daniel H. Janzen, "Costa Rica's Area de Conservacion Guanacaste: a long march to survival through non-damaging biodiversity and ecosystem development," 7. Paper presented to Norway/UN conference on "The Ecosystem Approach for sustainable use of Biological Diversity" in 2000, widely circulated by the author as an electronic document.
6. BACK Janzen, "Tropical Ecological and Biocultural Restoration," 243.
7. BACK Ibid., 244.
8. BACK Again and again, Janzen and Hallwachs have insisted that there cannot be ecological restoration without what they call 'biocultural restoration,' and especially the creation of 'bioliteracy' among schoolchildren. For a recent account of the ACG's very impressive education programs, see Rosibel Elizondo Cruz and Róger Blanco Seguro, "Developing the Bioliteracy of School Children for 24 Years: A Fundamental Tool for Ecological Restoration and Conservation in Perpetuity of the Area de Conservación Guanacaste, Costa Rica," *Ecological Restoration* 28, no. 2 (2010): 193—198.
9. BACK Janzen, "Tropical Ecological and Biocultural Restoration," 244.
10. BACK Janzen, "Tropical Dry Forest," abstract, pt 9.
11. BACK Janzen, e-mail to author, January 2, 2010. Sq bracket amendment by Janzen, email to author 23 May 2011.
12. BACK Daniel H. Janzen, "Gardenification of Wildland Nature and the Human Footprint," *Science*, 279 (1998): 1313, doi: 10.1126/science.279.5355.1312.
13. BACK Daniel H. Janzen, e-mail to author, January 2, 2010. During our interview, Janzen and Hallwachs also made the point, which recurs in various forms throughout this book, that techniques like these are, in essence, familiar to farmers and foresters, and only seem novel to restorationists with little experience of those millennial fonts of biological lore.
14. BACK Janzen, "Long March,," 8.
15. BACK Janzen, "Tropical Dry Forest," abstract, pt 4.
16. BACK Janzen, "Tropical Dry Forest," 561.
17. BACK Janzen, "Tropical Dry Forest," 566.
18. BACK Janzen, author interview.
19. BACK Ibid.
20. BACK Ibid.
21. BACK Janzen, "Long March," 12.
22. BACK Janzen, "Dry Tropical Forest," 578.
23. BACK Janzen, author interview.
24. BACK Daniel H. Janzen and Paul S. Martin, "Neotropical Anachronisms: the Fruits the Gomphotheres Ate," *Science* 215 (1982): 19—27.
25. BACK Janzen, author interview.
26. BACK The 'living dead' is Janzen's provocative phrase for those species that continue to exist in a system today, but that are doomed to extinction under present and foreseeable future conditions.
27. BACK Janzen, "Tropical Ecological and Biocultural Restoration," 244.

28. BACK Janzen, author interview.
29. BACK Janzen, "Tropical Dry Forest," 571. Janzen told me that he believes the jaguar population in the ACG is now somewhere between 50 and 150 animals. He thinks this exceeds the park's carrying capacity for the species, because individuals are being spotted beyond its boundaries with increasing frequency. Something that is not easy to explain to neighbouring ranchers who are losing calves to a big cat that had long vanished from their lands. Conversation on field trip to Santa Elena, January X, 2010.
30. BACK Janzen, "Dry Tropical Forest,," 572.
31. BACK As we saw in the main text, a particularly significant rhythm is the gradual replacement—succession—of deciduous by 'evergreen' trees, with massive concomitant changes in the understory. For another discussion of the ways in which restoration can homogenize (and sometimes reduce) biodiversity, see Chapter Thirteen, Page XYZ.
32. BACK Janzen, "Dry Tropical Forest," abstract, pt 8.
33. BACK Ibid., abstract, pt 4. For another discussion of this issue, see New Zealand chapter.
34. BACK These are local people who, with little or no formal scientific training, use extensive low-tech field research, synchronised with high-tech US laboratory analysis, to document the ACG's biodiversity. Since 2003, Janzen and Hallwachs have linked their taxonomic studies at ACG to a 'bar-coding' project, whereby genetic information is translated into a code similar to the one that identifies a packet of cereals at a supermarket check-out: "the use of a standardized short mitochondrial DNA sequence to identify specimens and flush out undisclosed species." [Daniel H. Janzen, Winnie Hallwachs et al., "Integration of DNA barcoding into an ongoing inventory of complex tropical biodiversity," *Molecular Ecology Resources* 9 (Suppl. 1) (2009): 1, doi: 10.1111/j.1755-0998.2009.02628.x]; for a popular article on their involvement in barcoding, and

    the robust debate about its contribution to taxonomy, see Gary Wolf, "Barcode of life," *Wired*, October, 2008, 200–212. http://www.wired.com/science/discoveries/magazine/16-10/ff_barcode?currentPage=all].
35. BACK Jerry Adler, "Daniel H. Janzen," *Smithsonian* 36, no. 8 (2005): 88-89.
36. BACK E-mail to author, January 2, 2010.
37. BACK Janzen, "Long March," 10. In this passage, Janzen continues: "An on-going example is the ACG plant Species Home Pages project: (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… 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."
38. BACK Janzen, informal presentation by Janzen to a group of visitors to Santa Rosa, including the author, January 7, 2010.
39. BACK Janzen, author interview.
40. BACK Ibid.
41. BACK Ibid.
42. BACK Ibid.
43. BACK Ibid. In commenting on a draft of this chapter, Janzen could not resist adding, not without mischief: "listening is definitely one way to study—ask any bird biologist."
44. BACK Ibid

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