DIESEL-DRIVEN BEE SLUMS AND IMPOTENT TURKEYS

MAKING THE CASE FOR RESILIENCE

CHIP WARD

INTRODUCED BY TOM ENGELHARDT

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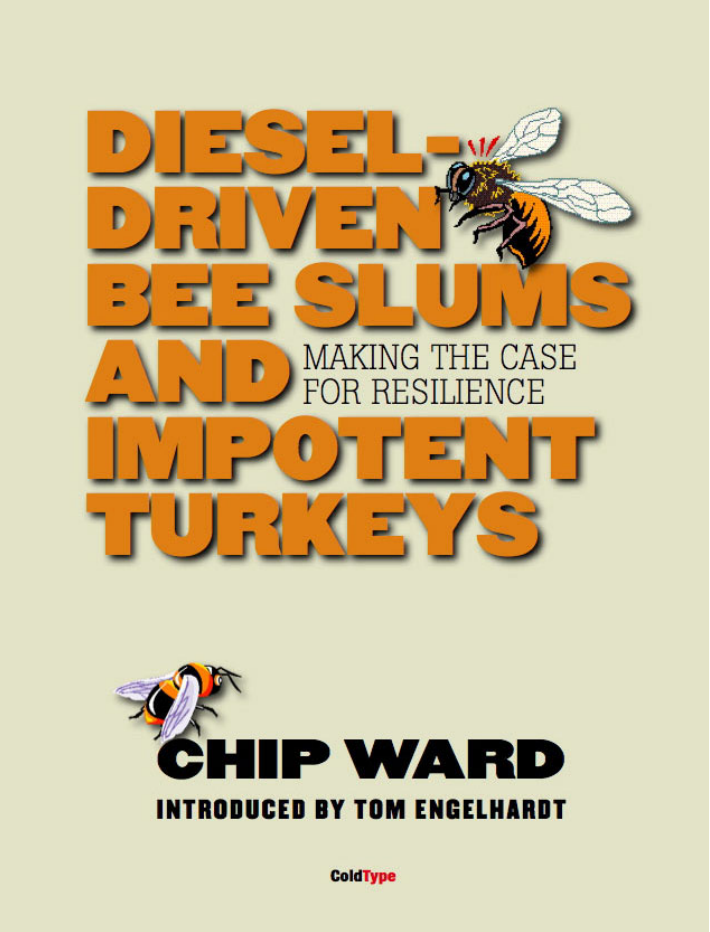

Chip Ward is a former public library administrator and grassroots activist turned writer/advocate. His book, *Canaries on the Rim: Living Downwind in the West*, is an account of his campaigns to make polluters accountable and *Hope's Horizon: Three Visions for Healing the American Land* explores the cutting edge of America's conservation movement. He writes from Torrey, Utah.

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INTRODUCTION
Tom Engelhardt

It's true that no single incident or development – no matter how out of the ordinary or startling – can straightforwardly be attributed to climate change. Nonetheless, it seems strange that the massive flooding in England, of a sort last seen more than 60 years ago, led the TV news and made front pages here with hardly a mention of global warming. You certainly won't see a headline like this one from the British Telegraph: "Floods show global warming is here."

And yet this has been "the wettest May to July period for England and Wales since records began in 1766." The recent "Great Flood of July" in southern England followed a somewhat similar June event in the north. As parts of the country are still submerged in the wake of torrential, tropical-style deluges (a month's worth of rain fell in a few hours), while record extremes of heat "roast" central and southern Europe, the subject of climate change is certainly on European minds – and a group of scientists are evidently going to release a study in the journal Nature this week that claims "more intense rainstorms across parts of the northern hemisphere are being generated by man-made global warming."

No American media figure, for instance, has wondered publicly whether, someday, England could become, in Gore-like "inconvenient truth" terms, the partially sunken Florida of Europe (along undoubtedly with Holland and other low-lying areas of the continent). It's no less true that a season of startlingly widespread and fierce wildfires, based on long-term drought in the West, Southwest, and Southeast has been a news leader for months – the TV news just adores the imagery of storms and fires – again, most of the time, with little linkage to larger possible changes underway. We are, it seems, a resistant species when it comes to thinking about the need to truly reorganize ourselves on this fragile, but resilient, planet of ours.

And yet, even when no good TV images are produced and the changes are far more subtle, climate chaos is already pushing stressed ecosystems in new and unpredictable direc-

tions. It seems indisputable that, if we are going to weather (literally) the punches Mother Nature throws our way, we will need to do more than improve evacuation routes when storms hit or put more firefighters on the line when parched lands ignite. We will also have to reconsider how we deal with the natural world – at present, largely as a collection of commodities to be endlessly manipulated for profit and convenience or as a set of touring destinations.

So think of Chip Ward's essay that follows as a challenge to just such thinking. It might as easily have been entitled, "Why the Organizing Principle of Industrial Civilization Is Just a Big Misunderstanding." Taking up a recent, startling development in the commercial world of nature – the collapse of bee colonies across the U.S. – it explores ways in which our cult-like devotion to the notion of making all things efficient has become dysfunctional, even dangerous.

Ward is well-known in his area as a grassroots activist working on toxic and radioactive waste issues. His early writing, especially his book *Canaries on the Rim: Living Downwind in the West*, focused on how to make polluters accountable. Recently, he moved to the remote wilds of southern Utah where he has had to cope with some of nature's inevitable disturbances – wildfires and flashfloods – that have made him think about how recovery from such disturbance happens and how we might help recovery along (and so help ourselves as well).

DIESEL-DRIVEN BEE SLUMS AND IMPOTENT TURKEYS

CHIP WARD

Resilience. You may not have heard much about it, but brace yourself. You're going to hear that word a lot in the future. It is what we have too little of as our world slips into unpredictable climate chaos. "Resilience thinking," the cutting edge of environmental science, may someday replace "efficiency" as the organizing principle of our economy.

Our current economic system is designed to maximize outputs and minimize costs. (That's what we call efficiency.) Efficiency eliminates redundancy, which is abundant in nature, in favor of finding the one "best" way of doing something – usually "best" means most profitable over the short run – and then doing it that way and that way only. And we aim for control, too, because it is more efficient to command than just let things happen the way they will. Most of our knowledge about how natural systems work is focused on how to get what we want out of them as quickly and cheaply as possible – things like timber, minerals, water, grain, fish, and so on. We're skilled at breaking systems apart and manipulating the pieces for short-term gain.

Think of resiliency, on the other hand, as the ability of a system to recover from a disturbance. Recovery requires options to that one "best" way of doing things in case that way is blocked or disturbed. A resilient system is adaptable and diverse. It has some redundancy built in. A resilient perspective acknowledges that change is constant and prediction difficult in a world that is complex and dynamic. It understands that when you manipulate the individual pieces of a system, you change that system in unintended ways. Resilience thinking is a new lens for looking at the natural world we are embedded in and the man-made world we have imposed upon it.

In the world today, efficiency rules. The history of our industrial civilization has essentially been the story of gaining control over nature. Water-spilling rivers were dammed and levied; timber-wasting forest fires were suppressed; cattle-eating predators were eliminated; and pesticides, herbicides, and antibiotics were liberally applied to deal with those pesky insects,

weeds, and microbes that seemed so intent on wasting what we wanted to use efficiently. Today we are even engineering the genetic codes of plants and animals to make them more efficient.

SURPRISE HAPPENS

Too often we understand the natural systems we manipulate incompletely. We treat living systems as if they were simple, static, linear, and predictable when, in reality they are complex, dynamic, and unpredictable. When building our man-made world on top of those natural systems, we regularly fail to account for inevitable natural disturbances and changes. So when the "unexpected inevitable" occurs, we are shocked. Worse, we often find that we have "all our eggs in one basket," and that the redundancy we eliminated in the name of efficiency limits our options for recovery. This applies to man-made systems, too.

Our efficient energy and food systems are perfect examples of how monolithic and brittle our infrastructure can become. Political turmoil in the Middle East, storms ravaging offshore oil wells, refinery fires, terrorism, and any number of other easily imaginable, even inevitable disruptions send gas prices soaring and suddenly our oil-dependent economy is pitched into a crisis. Because there is no readily available alternative to how we fuel our way of life – no resilience – our dependence on fossil fuels leaves us especially vulnerable to crisis. Our food system is likewise vulnerable, since it is so dependent on oil-based fertilizers and pesticides and relies on cheap and consistent supplies of gas for farm machinery and shipping.

Redundancy – alternative energy sources, for example -– would have left us options to fall back on in a time of such crisis. We did not develop those options, however, because they weren't considered "competitive." That is, if one energy source is cheaper to produce than others – ignoring, of course, all the associated and unacknowledged environmental and health costs – then that is the predominant energy source we will use to the exclusion of all others. Decades ago, oil and coal were cheap and so we constructed an entire energy infrastructure around those resources alone. (Nuclear squeaked through the door only because it was so heavily subsidized by government.) Solar and wind couldn't compete according to the rigid market criteria we applied, so those sources hardly exist today. We are still told that we will get them only when they become more competitive.

Our focus on efficiency in building man-made systems has been short-sighted because it fails to anticipate change over the long run. Resiliency is eliminated at each turn by owners, managers, and planners steeped in the cult of efficiency and trained to cut out profit-reducing redundancy whenever it appears. In organizations, this usually works well – at least for a while. But our attempt to maximize the use of natural systems has, in this regard, been an unmitigated disaster.

Most of the technological means we use to overcome nature's inefficiencies seem clever

and beneficial until the long-term drawbacks dawn on us. In the Northwest, for instance, dams seemed like a great way to produce electricity and make rivers navigable until, that is, the salmon began to die and an entire Northwest ecosystem that depended on salmon began to unravel. Until they broke under the power of Hurricane Katrina, the levees in New Orleans seemed to be a neat alternative to those messy coastal wetlands and inconvenient barrier islands we had wiped out for keeping storm surges in check.

BEES DROP DEAD

The recent collapse of honeybee colonies across the United States provides a compelling example of how we removed resilience from a fundamental ecological service – pollination – to make it more efficient and the unexpected blowback we are now suffering from that. In this case, there is little resilience in the man-made system of food production that relies on healthy populations of commercial bee colonies to pollinate crops and too little resilience left in the natural world for bees to recover quickly from whatever is wiping them out.

Pollination is a fundamental process that happens many ways – birds do it, bees do it, even butterflies and moths do it. But humans who grow food rely almost exclusively on bees; and not the hundreds of species of wild bees either, but one bee, the European honeybee. Sometimes resilience in nature is the availability of diverse options to fall back on in times of disturbance, but even when there is one choice, like bees for pollinating crops, there are still resilient features, redundancies that we eliminate at our peril. For hundreds of years, numerous dispersed and varied bee populations meant that a scarcity of bees here could be compensated for by an abundance of bees there. Not anymore. We have grabbed this key ecological process to maximize its use and have wrung out what resiliency there was.

Although the widespread disappearance of bees from our landscapes sounds like the stuff of melodramatic science fiction, like those movies about Ebola virus or asteroid strikes, the situation is both dire and all too real. Bee-tracking experts estimate that, across 26 states, between a half-million and a million of 2.4 million bee colonies have collapsed this year. Because many fruit, vegetable, and seed crops, worth about $12 billion annually, rely on the most affected bee, the European Honeybee, for pollination, bee loss will translate into increased food costs for consumers and a potential loss of food variety as well.

Nobody knows for sure why bee colonies are collapsing. German researchers recently speculated that the rapid growth in cell-phone use might be a cause, that some kind of tipping point had been crossed where bees could no longer navigate and communicate in an electro-magnetic environment saturated with cell-phone signals. This speculation is based upon experiments in which forager bees abandoned hives next to which cell phones had been placed. But bee populations are collapsing across the nation, including in areas with less cell phone ubiquity.

WHERE HAVE ALL THE FLOWERS GONE?

The suddenness of the collapse is puzzling, but one possibility would be the emergence of some new killer parasite or bee mite – a development that could result in such a precipitous decline. After all, bee pollination is big business. Bees are transported and mixed today in ways never before possible, giving the tiny parasitic critters that bees carry in their guts all sorts of opportunities to find new hosts. But whatever the specific cause of bee colony collapse, the context of this pollinator catastrophe is an old story.

Once upon a time we had lots of small, local farms. Farmers relied on dispersed bee populations to pollinate their crops, enhanced and encouraged by the work of local beekeepers. When monoculture was but a glint in the agricultural eye, when cows, chickens, pigs, and more than one crop was still part of the farming dynamic, a farmer might also keep a hive or two. Before we replaced meadows and prairies with sprawling subdivisions, there was enough habitat for local bee populations to thrive and meet agricultural demands. Not anymore.

Today, when farms are massive and almost invariably dedicated to single crops, there just aren't enough local bees to do the work required. In addition, the crops we grow need to be pollinated at different times. So, for example, vast crops of almonds in California need to be pollinated in February when there aren't enough local bees around, so the growers import bees to do the job.

DIESEL-DRIVEN BEE SLUMS

In fact, we ship billions of bees from here to there and back again in tractor-trailer trucks to pollinate our food crops. Like so many other aspects of modern agriculture, bee pollination has become a business that matches the scale of our food-production system. So, out with the inefficient, inflexible, insufficient local bees and in with diesel-driven colonies of commercial bees that arrive in sufficient numbers where and when we want them. The top beekeeping corporation in America can put 70,000 hives on the road at one time.

What happens to bees in such circumstances is probably similar to what happens to all creatures living in crowded and overpopulated environments – illness can spread quickly. A dairy farmer in Vermont told me that, when you have a hundred cows in the milking barn, you can use antibiotics sparingly. But put a thousand cows together and you're applying antibiotics all the time. Whatever happens in one cow's blood stream tends to go through the whole herd quickly – and the more cows that are crowded together, the more viruses, parasites, and infections are in play.

The same thing happens to chickens and pigs in factory farms, which is why they get antibiotics routinely. Why would bees be an exception to the vulnerability to illness that

comes with agriculture conducted on such a massive scale? You can't, however, apply antibiotics to bees the way you can to cows because bees are more likely to trade mites than infections, so new miticides are being developed.

Logically enough, bee vulnerability is increased if the immune responses of the bees are low. A friend of mine drove tractor-trailer trucks filled with bees as a summer job in college. He drove by night when the bees were in their hives and quiet. The goal was to get to his destination before dawn and unload the bees onto the targeted crop before they became busy, uncooperative, and agitated. When the trip was rough, when there were breakdowns or bad weather en route, he said, thousands of bees died. If stress kills bees, it is not unreasonable to assume it lowers immune response.

Bees have to be fed between trips. High fructose corn syrup is hauled to them in tanker trucks, which probably isn't any better for their health than it is for ours. Bees, of course, encounter and incorporate pesticides and herbicides in the fields they pollinate, as well as all the other background pollutants we have put into the environment. Toxic chemicals also lower immune thresholds. Who knows what those genetically modified plants they encounter do to them? Add it all up and you get overcrowded, malnourished, stressed-out, poisoned, possibly cell-phone radiated, disturbed bees. Any – or all – of this could contribute to the present colony collapse, or it could be due to some as yet unknown factor or development. When it comes to resiliency, however, it doesn't matter. What does matter is the missing redundancy in the system.

FLOWER POWER

This sort of colony collapse has happened before. The occasional collapse of bee populations has been recorded over the past couple of centuries, though not in the present widespread form. Obviously, bee populations eventually recovered. Is it reasonable then to expect that they will recover again? Yes, but not right away. Habitat destruction – all those sprawling burbs where bee-flowers once bloomed – mean less room for bees to recover and fewer colonies of dispersed local bees to replenish diminished populations. Lots of viable habitat is also an important aspect of resilience. In other words, natural pollinators are no longer resilient – they cannot quickly recover from a disturbance like an epidemic. If we expect to continue to rely on fossil-fueled bees, packed like Third World slum-dwellers onto trucks, then we can expect future die-offs as well, whatever the cause of this one.

If we understood and appreciated the need for resilience, we would not just rebuild commercial bee colonies as we certainly plan to do, but would also find ways to encourage local beekeepers to grow healthy colonies of dispersed bees. That way we wouldn't have all our bees in one basket. (The scientific term for such a precaution is modularity.). We would conserve or restore bee habitat. We would move away from agricultural models that require pol-

lination on a scale that local bees cannot hope to satisfy and on schedules that are out of sync with what bees can do naturally and locally.

We could focus more on what makes bees healthy than on what makes them convenient and profitable. We might even realize that industrializing bees is not as efficient as we imagined. In the long run, such arrangements only make growers vulnerable to bee-colony collapse. And we would not be so quick to replace an ecological service (a process nature provides for free) that is resilient with an artificial version of the same with next to no resilience.

A WORLD OF IMPOTENT TURKEYS

When biodiversity is sacrificed to improve efficiency, we lose options and become vulnerable. American farmers, for example, once grew a wide variety of indigenous breeds of turkeys. Today, 99% of all the turkeys raised commercially belong to a single engineered breed. It has a very meaty breast and so is exceptionally efficient in terms of getting the most white-meat bang for the buck, but it must be intensively managed with high protein feed, medication, and climate-controlled housing. That's expensive to do, so just three corporate breeders supply just about the entire world's turkey market.

Sadly, those super-chested turkeys are incapable of reproducing on their own. Without artificial insemination, they would disappear in a single generation. Their genetic base is exceedingly narrow as well, making them highly vulnerable to disturbances. A catastrophic die-off of turkeys is likely sometime in the future. What would make this component of the food system more resilient? You fill in the blanks here – be sure you use the words "local," "dispersed," and "diverse."

We have likewise lost diversity and resiliency in the plants we eat. The diversity of the genetic base of the world's wheat and rice supplies is so diminished by commercial manipulation that these crucial crops are vulnerable to a catastrophic blight if scientists in agrobusiness labs don't remain one slight step ahead of evolving plant diseases. If, at any point, they falter in that race, widespread starvation and the political and social chaos that accompanies famine will only underscore, in the grimmest way possible, the dangers of imposing artificial notions of efficiency on a dynamic natural process. Untrammeled efficiency turns out to be as risky as it is arrogant.

CROSSING THRESHOLDS

Ultimately, the loss of resilience can result in profound and unanticipated changes that happen when thresholds are crossed and ecosystems shift suddenly into new patterns of behavior with no way back. I live in an arid western desert that was once a vast grassland. Pioneers reported that the grass was as tall as the shoulders of their horses. Hundreds of thousands of cows were driven in to graze on the abundant food. Settlers expected that, like

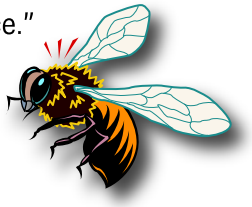
the pastures they knew in the east or the Midwestern prairies, the grass would be an annual affair, that it would always return. Not so.

Once it was over-grazed, the grass died out and pinion and juniper trees moved in. Massive erosion followed and today the barbed-wire fences of those original ranches dangle twenty feet above the arroyos that were washed out under them. That, too, is an old story.

How many thresholds were crossed as the ancient forests of the Middle East were turned into parched wasteland by the man-made disturbances of clear-cutting and overgrazing? How many thresholds are we approaching today that we do not see coming? Already, major ocean fisheries have been so depleted that they will likely never recover but will shift instead into new, unrecognizable ecological regimes.

Restoring resilience to man-made systems will require an eye for options, an appreciation for redundancy, and a tolerance for chaos. Messy organizations may also be creative. But, hard as it may be, we will always find it easier to anticipate disturbance and build choices into our man-made systems than to understand how to conserve resilience in the natural systems that support us. To do that, we must grasp the deep underlying relationships between such "slow variables" as weather, soil composition, and plant succession that we often miss. We will have to learn to see how connectivity and feedback loops operate in nature and how futile it is, in the long run, to impose narrow notions of efficiency on natural systems that are profoundly dynamic and inherently unpredictable.

How resilient are we? Crisis is also an opportunity for change. As the bees die, we are getting an unmistakable warning. Without pollination, life as we know it is not possible. Think "tiny canaries in the coal mine." Then think "resilience."



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