Non-Point Pollution: Tractable Solutions to Intractable Problems
By Dr. Mason Gaffney

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NON POINT POLLUTION:

TRACTABLE SOLUTIONS TO INTRACTABLE PROBLEMS - Part 1

By Dr. Mason Gaffney, Redlands, CA

(This paper was presented at a conference on "Political, Institutional and Fiscal Alternatives to Accelerate Nonpoint Pollution Programs" on December 9, 1987. The Symposium was held at Marquette University, Milwaukee, WI, and led by Prof. Vladimir Novotny and sponsored by the Engineering Dept.)

THE SPECIAL CHALLENGE TO ECONOMIC THINKING

Nonpoint pollution goes right to a chink in the armor of conventionally trained economists (like myself) who are overtrained towards becoming protagonists of the price system. To the skeptical we are "free market freaks": eco freaks who are -nomic rather than -logical. Whatever our faults we are zealous, and carry the conviction of true belief. With the problem at hand, however, we can't do what we do best, that is call for price signals, punt, and slip away.

The very name "nonpoint" pollution suggests that economists see this as just an odd bit of clutter, something "non-regular" in their tidy world. Indeed, all pollution was an exception, an "externality," until recently (at least at my age it seems so). Then they learned you can meter effluents and tax them, or trade effluent rights around like private property. Thenceforth they could fit pollution right into existing models and ideologies with minimum intellectual strain. They were happy as Procrustes with a new guest.

But we can't meter runoff—how frustrating. It comes from areas—how disorienting. Its damages are spread unequally over other areas, differentially populated—how non-homogenous. Standard brand economists are illequipped and undisposed to face such problems.

Conventional price theory has been accused of mocking physics because it uses some elementary calculus, but if so it is a poor imitation: it deals with an imaginary world abstracted not just from friction but from space and time themselves. Space is relegated to one subdiscipline (location theory) and time to another (finance), so regular price theorists can spin their webs in purest abstraction, undistracted by these details.

Most price theory is spaceless. Even location theory, at least the most common kind, conventionally treats cities as Euclidean points: the math is simpler that way. Newton could get away with it explaining planetary motion; students of urban sprawl can not.

Economists are also ill-equipped to deal with ecology. Economists' "externalities" pour into a biosphere of interdependencies at least as complex as what economists purport to understand. Economists are too disposed to underrate the sensitivity, passion and numbers of Nature's votaries, and the real economic value of the philosophical values they celebrate. Fisheries economists are a notable exception, although they probably impose more economics on biology than vice versa. But most economists treat "eco freaks" as noisy nuisances. In the absence of a real ecologist I will presume to take their part.

Economists, I hasten to add, are often useful citizens (both male and female, in spite of the male pronouns I use). Economists have been lumped with "soft scientists" —chemists really know how to hurt a fellow. But as a budgeteer allocating limited resources among competing ends his favorite posture —it is often the economist, the soft scientist, who makes hard choices among hard scientists with soft programs.

Another good use for economists, when mixed with natural scientists, is to temper extremism among those susceptible to technofascination. Some white-smocks, vested with prestige and authority once reserved for black-robes and redcoats, are given to optimistic fancies based on what science can do, as opposed to what slobs in the field actually will do. It is the economist's fate to study the latter, which accounts for his twisted smile and sardonic inside jokes.

But sometimes a positive-thinking economist (there are a few) develops affirmative enthusiasms of his own for social and political programs that transcend particular technologies. Then he may need natural scientists to temper his zeal, as you may temper mine in what follows.

THE SEARCH FOR SURROGATES

The frustrated economist, unable to tax runoff, still has a bag of tricks. He looks for surrogates to tax, something in a sack or bottle that moves through a market: Aha! pesticides, fertilizers, salt, they'll do nicely to tax. Thus we will "internalize the externalities" and have "proper pricing of inputs" to create incentives for correct "trade offs" in the "production functions," and we're nearly home. Well, halfway home. Well, we've made a start. A few problems remain. One is that a plurality of economists don't like the effluent charge approach anyway, even for point (continued on pg. 8)

NON POINT POLLUTION (from page 7)
sources. They follow Coase and prefer to grant pollution entitlements to be traded in a free market. Incredibly (to me) this view has prevailed.

In principle they profess not to care what worthy few get the original entitlements, but in practice a select company of ancient and honorable polluters get them. We now call these "offset rights," a new form of property. In the L.A. Basin (South Coast Air Quality Management District), a few have grown rich by establishing their respective histories of pollution which they can now sell to others who wish to continue this wholesome tradition. The demonstration effect on those contemplating new and as yet unregulated forms of pollution may be imagined.

Those needing air to breathe? Well, according to the modern philosophers they can enter the market, buy up offset rights and retire them. Thus is fulfilled Robert Ingersoll's forecast a century ago that if some corporation could bottle the air they would charge us to breathe. It seems to confirm this dour warning from a former Secretary of Labor:

> "We soon discovered ... the danger of allowing economic policy to be dominated by business or financial interests or, which usually comes to the same thing, orthodox economic analysis." (Marshall, p.ix) (emphasis added)

The public has learned what is being done to it, finally, and is rebelling at the Coase logic, which only a Chicago economist could love. Offset rights are on the ropes. To simplify, therefore, I am not going to speculate how Coase might be applied to nonpoint, but just ignore it. I will treat effluent charges, and taxes on surrogates, as the conventional economic solution to pollution.

But before leaving this there is a lesson in it. The holders of offset rights, whether "ancient and honorable" or "innocent purchasers," are demanding compensation. Never mind about asking them to pay the victims; they demand payment to stop! (Polakovic, 1987)

They will probably get it, for if the system be changed, there will be a taking of something, which they claim is property. Such is the force of the Great Secular Superstition, that unearned gains are sacred, even those originating with something as unworthy as dumping crud on other human beings. This superstition is why effective control seems so expensive. My remarks will not be instructed by it.

The surrogate approach may work through regulation and prohibition as well as taxation. Banning DDT and other organochlorines after 1972 has solved or prevented a lot of nonpoint problems, as you know. We may also tax or ban other pesticides of long residual life, stimulating a predictably successful quest for pesticides that self-destruct after doing their job.

But economists balk at absolutes. They have to admit that Rachel Carson and William Ruckelshaus and Russell Train won some games while economists sat on the bench, but they can show you things would be better with more tempered, measured responses. They prefer taxation to regulation: it inhibits rather than prohibits. It is more flexible, leaving latitude for applicator adaptation, recognizing the smoothness and continuity of production and damage and substitution functions.

They would point out, for example, that making pesticides costlier would discourage the present practice of routine preventive or "insurance" spraying, and incent farmers to spray only when the bugs are up to an "economic threshold." Regulation to achieve the same end would be much more difficult, almost like a prescription drug system, presupposing an entomology profession with the moral and legal authority and tradition of the medical profession. Economists would point out that inhibition rather than prohibition is compatible with IPM, the optimizing solution.

You've heard the traditional spiel, it is arguable. We can inhibit nonpoint pollution, in some ways optimally, by controlling surrogates. But let's look at the problems that would remain.

a. Taxes overlook the locational element, whereas damages vary according to the site of the runoff. A tax imposed only in critical areas is avoidable by importing the input from tax-free zones. We could tax uniformly everywhere; but a uniform tax on, say, nitrogen fertilizer would, in order to protect certain waters, reduce yields from all lands. Presently that would pull more acres into use, worsening other problems.

b. Taxes raise revenue, and recipients develop vested interests in the revenue, interests which may come to override the regulatory purpose of the tax. The main issue of 19th century tariff debates was regulation vs. revenue.

c. Excise taxes are not leakproof. The volume of bootleg cigarettes should give us pause, and I (a small fruit grower) have been tempted more than (continued on p. 9)

NON POINT POLLUTION (from page 8)

once with illicit supplies of Roundup. There is a huge underground economy in this country, a testament to man's irrepressible genius for tax evasion.

The underground economy sometimes rises to the surface, in episodes of rebellion, when deregulation is the vogue in government. I favor some kinds of deregulation myself, but the repressed cowboy psychology seizes these opportunities, too, to evade legitimate taxes and prohibitions.

There is a grand tradition of bailing out sellers with stocks on hand when a product is taxed or banned. Chlordane is a recent example. Dairy producers have been compensated when they could not sell their pesticide-contaminated milk. (Carlson, 1977, p.319)

To sell existing stocks tax free, when new ones are banned or taxed, creates a nice windfall. The 1972 Federal Pesticide Act also "provides for compensation to holders of patents on pesticides when registration removal occurs." (ibid.) The problem is, this whets the appetite for future windfalls.

It is something like the terrorism treadmill where ransoming one hostage stimulates future kidnapping. Some clever people will develop new harmful products whose future prohibition or taxation will endow them with more windfalls, etc. ad inf. There are more than 50,000 agricultural pesticides registered in the U.S. (Gianessi, 1987, p.1), giving a notion of the possibilities. This is a second kind of "pesticide treadmill."

Earl Heady has optimistically noted that herbicides are becoming more specific, tailored to certain crop problems (Nicol and Heady, 1977, p.339). Whatever else you can say about Roundup it is anything but that, and I wonder if we have yet to find an optimal set of incentives to bend the twig of research in desirable directions.

d. A tax on nitrogen could be avoided by growing legumes. Not a bad idea, perhaps, all things considered, but it just scratches the surface of the kinds of substitution, some of it unpredictable, that can occur when you tax a surrogate rather than the damaging effluent itself.

e. Taxing a surrogate fails to distinguish among individual applicators. It taxes the best for the sins of the worst, and credits the worst for the virtues of the best. Even if the rate be set optimally it will overtax the good and undertax the bad, and will not motivate anyone towards greater care and conscience to avoid harmful practices.

f. The objectivity and moral authority of the professionals on whom we must rely to evaluate pesticides is not unquestioned. This is a delicate area, but we must face a certain public skepticism. The University of California has just lost a court case in which they were accused and convicted of violating the Hatch Act by favoring agribusiness over family farmers. They are appealing, and damage-controlling, assuring the public (with public funds) what good people they really are, and how minimal the matter really was. Perhaps so: but they lost the case.

What would happen if their objectivity were questioned on the grounds that they accept large, directed grants from pesticide producers, let faculty members consult for the same, and push faculty members into grantsmanship? Would Rachel Carson have found happiness in a UC Department of Entomology? Will Frances Moore Lappé? Was Earth Day conceived under a grant from Monsanto?

U.C. Entomology Professor Robert van den Bosch was not amused by the dominance of what he called "the pesticide mafia." His Pesticide Conspiracy (1978), although tendentious, cites enough specifics to impugn several U.C. administrators, other universities, the USDA (that "wholly owned subsidiary" of the chemical industry), many congressmen, bankers and food processors, farm employers, most producers, salesmen and lobbyists, and at least one Nobel laureate. It is not a reassuring picture, nor is it reassuring that van den Bosch has been answered, if at all, by ridicule, personal abuse, and whispering. I draw the curtain of diplomacy over wherever these thoughts may lead.

Moral authority or not, there are questions of efficiency and expedition. The mills of EPA may or may not grind exceeding fine, but they do grind exceedingly slowly. Since 1972 EPA has arrived at suspending only 79 active ingredients. Most of its "reregistration" reviews are still in some interim stage. Apparently industry advances new toxins much faster than EPA reviews them, so the inventory of pending reviews can only grow.

g. The case for "proper pricing of inputs" is most persuasive when we can show that everything else in the system is working right first, as the optimal background we are to avoid distorting. But that is conspicuously untrue. When the system is balanced wrong anyway, what is one more distortion? It might even make things better, a viewpoint labelled "the theory of second best."

In fact, land use decisions are superimposed on a settlement pattern based on massive market failure in land. The phenomena rather imprecisely called "land speculation" and "absentee ownership" betray market failure; and no one disputes there is massive regulatory failure in pricing and subsidizing transportation, which in turn determine land rents and values. Result: the land market is not efficient; land is not properly priced and allocated to begin (cont'd on p. 10)

NONPOINT POLLUTION (from page 9)

with. This is the thread I will follow, although it may run afoul of The Great Secular Superstition.

SOURCES OF NONPOINT POLLUTION

All pollution is originally "nonpoint." It only becomes "point" pollution when someone has taken the trouble of gathering it at a small orifice in order to control it, often for the benefit of others. If we then tax point polluters while exempting nonpoint we will impair the incentive to control. That of course is why we are conferring now, and why we are looking at taxing surrogates.

Taxing and banning surrogates has a place, perhaps a big place in any control program. But it may not touch many sources of nonpoint pollution. Let's list them here; see what damage they do (next section); and then see what remains unsolved by taxing and banning surrogates.

Major sources of nonpoint pollution are: agriculture, forestry, mining, recreation, paving and rooftops, roads, lawns and gardens, onsite industrial waste dumps, and military, for a start. To these I would add the class of moving point sources, like autos and vessels and aircraft, which have part of the elusive character of nonpoint sources. I would add septic tanks; and moonlight dumpers; and everything served by a storm sewer, or no sewer at all.

"Construction" is usually added, but construction per se is innocent and should not bear the onus. It is rather grading, the destruction that precedes construction on new lands, that denudes land and allows runoff and blowing. Filling can be noxious, too, when it takes wetlands that otherwise help filter runoff before it hits shellfish beds and beaches.

So nice a distinction may seem picky, but it is heavy with policy meaning. The Sears Tower and the Empire State Building probably caused less runoff than any modern cookie-cutter subdivision. We can have needed construction without grading and filling by renewing and infilling our cities instead of promoting more urban sprawl. Milwaukee in the last 20 years has lost 20% of its population. Buildings are boarded up and land lies vacant while dozers and scrapers tear up new land upstream of it. At least one-third of Milwaukee, perhaps more, could and should be renewed forthwith, obviating much of the random lateral expansion onto new land whose runoff now causes so much grief down here.

Within agriculture it is common to hear that tillage is the problem; the solution, evidently, is grazing. On some lands that is true, but the generalization is not. On other more fragile lands, grazing causes runoff. Not for nothing are sheep called "woolly maggots," and the Arab called the father, rather than the son of the desert. Exploitive high-grading grazing, leaving weeds to take over the range, is another form of pollution —biological pollution, depleting the gene pool. As with all land problems, "where" and "when" are as important as "what." "A place for everything, and everything in its place," the slogan of land economics, is the proper watchword.

We sometimes hear that good organic manure is the answer. But on feedlots, too much of a good thing becomes a nonpoint pollutant. Cities in the upper Santa Ana River basin must provide tertiary sewage treatment, but the largest concentration of dairy cattle in the world, in the Chino basin, drains into the same waters. Next time you visit Disneyland if the water reminds you of Wisconsin, there may be a reason. (Chino, ironically, is in an agricultural preserve, to enhance the environment.) These feedlots also overlie what might be one of our most usable aquifers, in a region in sorest need of water storage.

Cities like Milwaukee are painted as victims of nonpoint pollution, but within cities the great anomaly is that the output of sanitary sewers is monitored and treated while that of storm sewers is not. A few blocks from this meeting in downtown Milwaukee you can see coal and salt stored in the open, draining directly into the Harbor with each rain.

In Riverside, the local scatological whimsy is "Flush your toilets, Orange County needs the water." It relieves the local inferiority complex, but actually that water gets tertiary treatment. It is our storm runoff that's dirty. Some cities of course have only one set of sewers, but that creates problems of its own which Milwaukee knows well.

In Riverside we have also poisoned many of our own water wells with toxic percolation from farm and industry wastes which, since they are inside our expansive city limits, we cannot blame on others; but which our prudent city fathers prefer not to identify too closely.

WHAT PROBLEMS ARE CREATED?

If the old problems of BOD, bacteria, nitrogen, sedimentation and phosphates are partially mitigated, new ones are upon us: toxic metals, new pesticides (and an accelerating pesticide treadmill), ammonia, and organic supertoxins (Harkin, 1985, p. K-II-4). The salts ye have always with you; and BOD, although perhaps mitigated inland, is still lethally high in Long Island Sound and Chesapeake Bay (Business Week, October 1987).

Damage is affected by reconcentration. (continued on p. 11)

NON POINT POLLUTION (from page 10)

Beneficial concentration of runoffs in dumps, to minimize damage, is inherently unlikely. Much of the damage does come from reconcentration of toxics in waterways and fats, but the damage is not restricted to riparian owners or ichthyophages since water supplies for large downstream cities depend on river waters.

Cities can treat polluted waters, of course, but at considerable cost, and substantially reduced consumer satisfaction with the product. The last may or may not be "just psychological," but it is a signal from the sovereign consumer which has led to such costly ventures as San Francisco's project to invade Yosemite Park, drown the scenic Hetch Hetchy Canyon of the Tuolumne, Yosemite's peer, and carry "sparkling mountain water" 158 miles back home; and East Bay's parallel venture to the Mokelumne River.

Sediment silts up harbors. To handle this problem we first need recognize we have too many harbors anyway, thanks to logrolling in Congress and the machinations of the Army Corps of Engineers. Rivers and Harbors are the classic porkbarrel vehicle of Congress. Wisconsin alone may have as many harbors as the whole Pacific Coast.

Part of any solution here is to stop subsidizing dredging. Subeconomic harbors would close; others would finance their own dredging, with this bonus for the welfare of all: they would redirect their lobbying budgets from the zero-sum game of soliciting federal funds to the constructive game of promoting runoff control.

Sediment also silts up reservoirs; and again we have too many, thanks to a long history of subsidizing water supply in western states. That is the pork you trade us for all those tiny harbors. We make it worse by penalizing water conservation ("use-it-or-lose-it" is the rule).

The lobbies and the engineers don't see it that way, of course, but then that is part of the problem, isn't it? We are so used to living and learning under the logic of the lobbies that we, the rightful heirs of Emerson and Thoreau, are conditioned to reject our own direct perceptions.

In the logic of true values we should probably put more weight on other damages, such as that land is sterilized, and people are poisoned. Species are destroyed or constricted, leaving the natural world to surviving coyotes, crows and sparrows. High-grading the forests leaves weed trees to inherit the earth, a form of genetic pollution.

It is the shame of economists that some of them make the world equate that with "materialists." Economics properly deals with how to meet human desires, and staying alive in a healthy, pleasing environment ranks high among those. Aldo Leopold makes a certain amount of sense from which micro theory might benefit. Macro, too: if Walter Heller had really "heard" Barry Commoner when they debated, or read him (Commoner, 19xx) we might be far ahead in this game.

Several writers treat salt runoff lightly. It may be of small concern in this region, but it is of monumental moment in the arid west. Downstream water becomes unusable, and water pooling and exchanging, from which so many economies could result, become much harder to negotiate ("my water is better than your water," etc.).

While we can't blame Washington for everything, it has a lot to answer for here. Much salt runoff comes from Federally subsidized water. Kesterson Refuge is poisoned by ruhoff from the Westlands Water District, irrigated under heavy Federal subsidy from the Central Valley Project (in spite of its long and notorious violation of acreage limitation provisions of the Reclamation Act). The worst problem on the Colorado is salt runoff from the Wellton-Mohawk project, near Yuma, a subeconomic boondoggle from start to finish. All extant Colorado River salt problems are now aggravated by the subsidized Central Arizona Project.

Other salt problems come via underground water. Irrigation applied upstream percolates underground and resurfaces at lower elevations, evaporates and leaves salt residues, sterilizing certain lands (e.g. below the Fresno Irrigation District).

But more ominous, aquifers themselves are impaired, and maybe destroyed forever. Americans have yet to hear this alarm bell, and take a frighteningly insouciant attitude toward groundwater. Even Earl Heady, an informed person, has written that pesticides only hurt us by being concentrated via the food chain (Nicol and Heady, 335). But in my little corner of the world, southern California, many aquifers are being impaired, perhaps lost forever by "downward runoff" or percolation of water laced with toxics.

I wish I could report this has made us more conscious of the problem than easterners, but if so that has not reached the MWDSC (Metropolitan Water District of Southern California), the apex of our water establishment, which neglects the problem nonchalantly. MWD is driven instead by the passion of its designs on all waters north to the Arctic Circle.

You think that's hyperbole? I wish! "Only Yesterday," in the '70s, there were several Senators and a big head of steam behind "NAWAPA," to tap the Yukon. Sensible, economical conservation of local aquifers is too prosaic, and besides it violates (continued on page 12)

NON POINT POLLUTION (from page 11)

the American credo of preferring the most resource-using solution. "Real men don't conserve resources; real men have vision and acquisitive genes, they sally forth like their warrior progenitors and grab more. Conservation is for sissies and besides, it would only demonstrate the folly of MWD's hydro-imperialism."

Damage to lakes and impairment of riparian values is notorious and needs no laboring here. We see some progress in protecting inland lakes, but now the oceans themselves are threatened. There is worsening damage to salt-water estuaries, gulfs, bays, and wetlands. Shellfish and finfish supplies are diminished and contaminated; the littoral is all littered; swimming is restricted; riparian amenities are impaired (Business Week, October 1987).

Urban invasion of coastal wetlands is an aspect of the problem. Wetlands have served as filters protecting the ocean: urbanize them and more raw sewage reaches the ocean. Here again the culprit is not "construction" as such, it is filling. Cuts in the hills increase runoff; fills in the wetlands reduce filtering. The combined effect is very bad news.

Wind drift is an episodic problem. Where there are windless days, it is controllable. But it only takes one human error, and in Hemet, California, in 1974, 2500 ducks were wind-drifted to death: lucky they weren't humans. Bees are routinely lost in large numbers. In Hawaii or Wyoming, lacking many windless days, one wonders.

Wind erosion from bare land is something else. Land laid bare stays bare in all weather, and a long "Santa Ana" windstorm blows it far and wide. Mother Earth will have her revenge.

Insects fly across property lines, wind or no. Nonpoint entomological pollution is a by-product of the pesticide treadmill. The biocide-by-pesticide of natural predators, followed by exploding populations of previously minor pests, has turned oversprayed fields into baneful insectaries spawning new horrors that fan out everywhere.

WHAT PROBLEMS ARE UNSOLVED BY EXCISE TAXES ON SURROGATES?

Summarizing from the two prior sections, here is a list of nonpoint sources and problems calling for solutions other than taxes on surrogates.

Soil runoff, a problem in itself and a vector for adsorptive pollutants

Denuded forest land

Forest roads

Mining: pit drainage, heap-leaching, drilling fluids, tank cleaning, oil spills

Open storage of materials: coal and salt in Milwaukee; sulfur in Vancouver and Texas; etc.

Return flow of irrigation water, with salts and toxics

Inappropriate tillage: non-contour, steep land, erosive soils, eroding climates

Inappropriate grazing: overgrazing, high-grading the herbage, steep land, compacting the soil, etc.

Dumping of all kinds

Septic tanks and cesspools

Leaking gasoline tanks

Land-grading: destructive scalping techniques in inappropriate places

Filling wetlands

Flooding, channel-scouring, etc.

Transportation of all kinds: a long subcatalogue

Animal waste

Industrial waste from unsewered areas

Paved lands and rooftops

Burned-over land: forest, brush, grass

Hyperpotent toxics and hypervulnerable individuals

Aquifer loss

Irreversible human damage and loss

Worker exposure

Nursing new pests due to predator destruction

(To be continued in the next issue of GroundSwell.)

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NON POINT POLLUTION: TRACTABLE SOLUTIONS TO INTRACTABLE PROBLEMS - Part 2

By Dr. Mason Gaffney, Redlands, CA

(Continued from Feb.-March 2017 GroundSwell. This paper was presented at a conference on "Political, Institutional and Fiscal Alternatives to Accelerate Nonpoint Pollution Programs" on December 9, 1987. The Symposium was held at Marquette University, Milwaukee, WI, and led by Prof. Vladimir Novotny and sponsored by the Engineering Dept.)

THE CASE OF FORESTRY

The inadequacy of surrogate pollution taxation is exemplified by forestry. The main purposes of watershed protection have long been to regulate water flows, to reduce flooding and erosion, and sustain flows during droughts. Minimizing pesticide runoff is a worthy additional purpose, but not the sole one.

Francisco Goya left hanging in The Prado two paintings of his beloved, La Maja Desnuda and La Maja Vestida. Some prefer the earthy Desnuda. When it comes to Mother Earth, however, she looks better Vestida in virgin verdure or some renewable replacement raiments. Gaia theorists, indeed, regard the biosphere as an integral part of the whole terrestrial organism.

However you regard it, removing it is hazardous and damaging to the children of Earth. Denuded land is the source of almost all forest runoff problems. Erosion results from a combination of logging roads (too many, too long, on land too steep); clearcutting; and slow replanting.

Slow replanting is the central problem. It slows the supply of second-growth timber, and thus creates pressure to invade submarginal areas. Foresters should harvest the low, flat, warm lands early and often because: a) Regeneration is economical there, it pays for itself where trees grow fast; b) Regeneration is fastest there, minimizing the exposure period of bare land; c) Logging roads may be shorter and less erosive there, because nearer to markets and on level land; d) The temporary loss of scenic beauty is less severe; e) The exposed bare land is less steep; f) Logging is cheaper and less destructive; selective logging is more feasible; g) Fire control is easier; h) Younger stands are more vigorous and naturally resistant to pests.

The last point bears underscoring here. It points to how good forest management can minimize pest damage without heavy reliance on toxics. The spruce budworm, for example, wreaks damage mainly on trees weakened by age. To protect those older trees, whole forests, millions of acres in the northeast are sprayed, with tragic treadmill results.

The tussock-moth, over which so much organochlorine has been shed in the fir forests, damages trees mainly on poor growing sites. Trees on good sites withstand defoliation, green up, and grow with renewed vigor. The moral: stay off the poor sites. The method: utilize the good sites fully.

Why aren't the good sites harvested early, replanted quickly, and utilized fully? One major reason lies in the tax system.

a. Replanting cost is not expensable for income tax, it must be capitalized, hence not written off until decades later when timber is harvested. Timber taxation was not neglected, you may be sure, by Oregon Senator Packwood who shepherded through our most recent tax reform; but timber lobbies have deliberately traded this off to keep what they prize more, the capital gains treatment of timber sales.

b. Most states have substituted the yield tax for the property tax. The result is a bias against early harvesting. When you look at the whole system it also pushes cutting pressure out to marginal lands. But a yield tax at a high rate wholly destroys any incentive to restock marginal lands, once cut: it makes them subeconomic to replant.

c. Some states have virtually eliminated the land value part of the property tax on timber, removing an incentive to early reforestation. A tax based on land value continues at a steady level during the sterile downtime of land between harvest and replanting, thus pricking holders in the most compelling way to restock, while not taxing them at all for actually restocking. On marginal land the tax base is zero (it being based on land value) so it does not cause abandonment, nor make replanting any less economic than it already is.

d. When timber is standing the value added by growth is partly unrecognized as taxable income. Timber has been a "capital asset" for income tax purposes since 1944. Not only is much of the gain unrecognized as income, but any tax is deferred until harvest. After timber is felled, value-added in the mills and markets is "ordinary" income and bears the full fury of the tax rates.

When timber is standing there is no property tax, so it need only grow fast enough to pay interest on its value. After it is cut it must yield a rate of return high enough to cover a property tax, too, not just on its stumpage value but also on the value-added by harvesting, hauling, milling, shipping, storing, merchandising, and constructing. (continued on page 8)

NON POINT POLLUTION (from page 7)

Thus the dual result of income and property taxes is to defer harvest, increasing the volume of old, disease-prone timber standing on good land, and pushing logging pressure out to marginal lands. Many marginal lands are non-regenerable. Logging there is simply mining, leaving La Tierra Desnuda and open to the elements indefinitely.

Forestry on public lands, ironically, manifests similar biases, from a different set of incentives. William Hyde, Marion Clawson and others have documented the pattern: undermanagement of superior sites accompanied by premature invasion of steep, remote sites as the Forest Service internalizes all its profits from timber sales to build more roads (and its empire).

Both private and public forestry generate specialists with information monopolies which they use to obscure these issues and divert us with others.

An optimal solution would constructively combine and synthesize two apparently contrary concepts of land stewardship.

THESIS: Concept A says "Conserve for the future."

ANTITHESIS: Concept B says "Stewardship means highest and best use." Landholders are responsible to use land now, in order to employ others (generate incomes), to produce goods (combat inflation), and pay taxes (avoid deficits).

SYNTHESIS: Concept AB says do both, but in different places. Use the good lands intensively, grow timber early and often, thus relieve human pressure and help conserve the vulnerable, erosive lands.

Until this is done, will optimal taxes on aerial sprays do much good? Some good, no doubt. But the main problems are deeper rooted and call for bolder measures.

That is my basic message. Forestry suffers from cutting sprawl, quite analogous to urban sprawl. The center is neglected, so the action moves to submarginal fringes and damages what's left of the center. Let us now look at two more cases, urban sprawl itself, and agricultural sprawl, where the source of problems is analogous, and the implied solutions the same.

THE CASE OF URBAN SETTLEMENT

The central problem here is urban sprawl; the solution is compactness. More land urbanized means more urban runoff. But more people on given land may even mean less runoff per acre, e.g. at the threshold where sewering can economically replace a collection of septic tanks and leach lines. It certainly means less runoff per capita. It means better control of any given runoff.

A compact, synergistic city is resource-saving; sprawl is resource-wasting, using up more land, capital, materials, fuels, and air/water quality to substitute for direct human contacts and cooperation. Here are some items that sprawl maximizes or worsens:

-- the number of car-miles for any given level of urban linkage, with smog generated in proportion. (The unforgettable demonstration of the last came in 1967 when Mayor Henry Maier closed all Milwaukee gas stations for a week, because of arson and riot threats. As a by-product Milwaukeeans saw, for the first and last times, what clean air really looks like -- glorious!)

-- paved areas, with salt and roadside litter both spread in proportion.

-- "and sudden death." Auto accidents, the ultimate "negative externality," kill some 40,000 Americans per year, maim many times more, and intimidate everyone.

-- grading and denuding new lands, generally upstream and more sloping. Three-quarters of the pollutant loadings in the Menominee River come from urban nonpoint sources. Developing urban areas cover only 2.6% of the watershed, but contribute 37% of the suspended solids and 48% of the phosphorous. (Bauman et al. 1980, cited in Falk, 1985, p. P-II-B-2)

-- number of homes on septic tanks.

-- diversion of sewer funds from treating sewage to collecting it.

-- larger lots and lawns, longer driveways.

-- inhabited areas without good fire protection, with more grass and brush exposed to humans.

-- private wells puncturing aquifer caps.

-- settlement and industry beyond gutters and storm drains.

-- withering of mass transit.

-- longer, wider utility rights-of-way, with higher voltage and pressure and hazard.

-- filling wetlands

-- occupying floodplains, so more flood control reservoirs are needed.

-- automobile dependency creates its own treadmill effect. The car itself is the major consumer of urban space, space which must in turn be traversed, using still more car-miles. Pedestrians and cyclers (continued on page 9)

NON POINT POLLUTION (from page 8)

are maimed and intimidated into becoming motorists. Mass transit withers away. The market does not lead us to optimal outcomes in such a world -- this world.

Suburbs abate their own problems by pick-pocketing central cities, e.g. by getting sewers they could not pay for themselves. Milwaukee Metropolitan is as good an example as any. Systemwide that is a dubious gain, when the central infrastructure goes to ruins. The titles of some seminal works on this subject tell the story quite well: America in Ruins (Choate and Walters, 1981); The Costs of Sprawl (Downs); "Cost-push of Urban Sprawl" (Schechter); "The City as a Distorted Price System" (Thompson).

Solutions to urban sprawl will involve at least these three courses:

a) Marginal-cost pricing of city services, with a spatial or locational component. Example: a water-rate surcharge rising with pressure zones. Cheap city services in the center, encouraging infill and centralization.

b) Renewal-oriented tax policy, especially in central cities. (Milwaukee needs this the worst way, having lost population and capital for many years now.) Renewal-oriented property taxation means to impose higher tax rates on land than buildings (Breckenfeld). Former Mayor Dan Hoan favored this policy (Hoan, pp. 26-27), and what Hoan favored, Hoan did.

Renewal-oriented property assessment accomplishes the same end by apportioning a higher share of assessed value to land, and less to buildings. During Hoan's tenure the City Assessor accomplished it by using the "building-residual" method of apportionment. He drew up, reproduced, and publicly distributed land value maps, on which every parcel was valued at its highest and best use, as determined by comparable sales in the neighborhood. This approach approximately triples the assessed value of land, as compared to current Milwaukee practice.

c) Renewal-oriented spending and service policy. One guide to this is "tiered" zoning and planning, firm and consistent. Attorney Robert Freilich, the "father of growth control," has shown how to make this work in Ramapo, San Diego, and we hope soon in Riverside. When Dan Hoan was Mayor of Milwaukee, 1916-36, he oriented spending this way reflexively (Hoan, Chaps. 2,8), to serve the existing city rather than to expand it. Milwaukee was a city that worked -- then.

One may prefer other measures. More should be said about constraining the space demands of cars and trucks. But the point is that whatever measures one wants, they will have to cut much deeper than taxing pesticides and fertilizers. We are talking about major, radical readjustments of urban, tax and utility policies.

THE CASE OF AGRICULTURE

Farming manifests the same problem as forests and cities. Public policy suppresses full use of the best lands while subsidizing use and abuse of marginal lands. As we said of urban sprawl, the more land in use, the more runoff. Here are some elements that cause "agricultural sprawl."

a) Urban sprawl takes the best land out of farming. Cities deserve the best land and get it, but urban sprawl inflates urban demand several times over. In the best light the demand is premature. Much of it is just wrong, now and forever.

Shock waves from exploding cities fan out through the entire hierarchy of farm land uses, but not as neatly as force travels through a row of steel balls in the lab. At each margin of supersession there is a transfer of chaos plus an increment. Citrus invades deciduous, deciduous sprawls out among vines and vegetables, these move into cotton, cotton pushes on alfalfa which displaces small grains which take over pasture which invades the forests, and at each margin there is a new contribution of sprawl, chaos or entropy, a loss of concentration and focus and good economic spatial organization of farm activities.

b) Land retirement programs, under whatever label (there's been a new variation on the theme every few years since 1933) put good land on ice to support prices. Under the resulting "price umbrella," marginal land enters production. This is classic cartel behavior.

c) Surpluses are destroyed at home, or dumped (sold below cost) abroad, under Federal subsidy.

d) Some crops associated with high erosion receive strong support or protection: wheat, corn, cotton and sugarbeets, for example.

e) SCS funds are not allocated by need, but per Senator. Aldo Leopold observed of SCS, "In our attempt to make conservation easy, we have made it trivial" (Leopold, p. 210). It is worse: we have made it a pork barrel, like rivers and harbors and missile contracts. So instead of cover-cropping problem lands we use SCS funds on lands that scarcely need them, reducing their output and increasing the pressure to till marginal lands.

f) We raise a farmer's property tax assessment for installing a truly conserving device like a Harvestore -- it is so visible. Yet it turns hay into silage. (continued on page 10)

NON POINT POLLUTION (from page 9)

The other farmer who stores corn silage in an open bunker pays few taxes while losing 1/3 to 1/2 of the product of an erosive culture.

Meantime we subsidize new and submarginal lands in dozens of ways. But on the farm as in the city, the more land, the more runoff. I have cited the Feds for the Westlands Water District draining into Kesterson Refuge, and the Wellton-Mohawk Project draining into the Colorado River.

The State of California is as bad. The whole arid southwest quarter of the Great Central Valley is being brought into cultivation using subsidized water from the California Water Project's Westside Canal. Promoters there have discovered another treadmill effect, the "groundwater treadmill" of local-depletion-and-state-rescue, a treadmill that seems good for any number of cycles. But salt runoff has reached such a pass that the next rescue requirement will be a "brine line" to the sea, a line whose outlet is as sought-for as a nuclear waste dump.

South of the Tehachapis the MWD has its own variation, the Mulholland cycle. MWD frightens city voters with drought forecasts, secures entitlements to excess water, and dumps it on surrounding deserts to enrich land speculators there. While waiting for urban sprawl to reach them they farm with the mindset of short-term tenants, caring nothing for soil conservation or permanent farm improvements.

Mulholland began the game in 1913, storing Owens Valley water in the San Fernando Valley (remember Chinatown with Faye Dunaway and Jack Nicholson?) It was too good not to replay; there have been several Sons of Chinatown. MWD is now watering an "avocado crescent" 200 miles north-south, with groves on slopes up to 45 degrees.

Will pesticide taxation control those problems? Rather, toxic runoff is just another of several reasons why we must face up to radical review of our political-economic treadmills, driven as they are by what TIME Magazine has called The Great American System of Public Works for Private Profit.

THE COMMON THEME FROM FOREST, CITY AND FARM

Market failure, public programs and perverse incentives in the land market create a gross bias towards spreading out too much. This aggravates otherwise fairly tractable runoff problems. The more Tierra Desnuda, the more runoff.

This perversion does not occur by accident. Spread and sprawl in forestry, cities and agriculture are common results of the dominant force driving American politics, the quest for unearned increments to land value.

Thorstein Veblen in his final testament, Absentee Ownership, noted that American farmers

> ...have always, ... wanted something more than their ... share of the soil; not because they were driven by a felt need of doing more than their fair share of work ..., but with a view to ... getting a little something for nothing in allowing their holdings to be turned to account (Veblen, pp. 138-40).

To enhance those values they will now invoke any complaisant higher power, and since God already did His bit by donating the Earth, they turn to Government.

But the profile of land values is like a volcanic island. To raise the top and the slopes and the shores we must also raise the shallows above sea level, where they shed the waters and come into use.

Rising population is one factor pushing up the profile of values, but not the strongest one. Increased demand per capita is the main factor. These demands include all the spurious demands described above, like the demand of government for land to "bank" and hold idle, and the demand of speculators "with a view to getting a little something for nothing."

Veblen went on to say that farm technology adapts to the Procrustean bed of absentee ownership: rather than leading, technology lags changes wrought by the ownership pattern. Thus it is not "society" or "efficiency" alone that mandate inorganic monocultural chemical farming, but also the peculiar needs of absentee owners holding more land than they can work themselves or with their families. Logic of, by and for this minority is set up as logic for all.

If this be true, or (more likely) partly true, it must be admitted that most academics go along and get along with this dominant minority. Organic farming, biological controls, appropriate technology, IPM, and other countervailing logics had to come from screwballs outside the system, plus a few martyrs and kamikazes inside it, dominated as it is by accommodating "regular fellows," "good old boys," noncontroversial administrators who "understand local needs" and "work with community leaders," and complaisant faculty who enjoy "credibility." Are we part of the problem? Let everyone debate that with his own conscience, and be fair enough to lose a few points. (continued on p.16)

NON POINT POLLUTION (from page 10)

SOLUTIONS

The solution is land stewardship, a new-old ethic to supplant the cowboy ethic in which western man has wallowed over several centuries of territorial expansion.

To reprise from the section on forestry, we must synthesize two concepts of land stewardship. Concept A says "save for the future"; Concept B says put land to full use right now, to serve and employ people. Concept AB says do both, but each in the right place. Use the good land, use it well and fully, employ the workers, serve everyone's needs. Congregate and cooperate on central, low, flat, fertile ground, as efficient markets and efficient public policies would dictate anyway. Leave the marginal land in peace.

But as we tiptoe into this new era let us not sell stewardship by making it too easy and trivial, lest we repeat the sorry history of SCS. We are all trained to be trivial, to make few ripples and no waves. We are conditioned by higher education, and disciplined by employers to accept and believe the basic premises of the system and contribute our mite, if any, only to reinforce or patch or adorn it. Hence the fascination of schemes like effluent charges and their analogues like excise taxes on surrogates. If those ripples look like waves to us, it shows how much we have to grow to deserve our ancestors.

Excise taxes have their place, true, but the problems at hand are much vaster and deeper than little measures reach. Solutions call for basic reconstruction and reorientation more drastic than most of us dare contemplate. But let's try: it might even be fun. Dan Hoan had fun making Milwaukee work; he is as good a model as we need.

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