ECONOMIC ANSWERS TO ECOLOGICAL PROBLEMS

SEYMOUR RAUCH

CENTENARY ESSAYS—No 2

3—

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RESEARCH ASSOCIATION

TO MARK the centenary of the publication of Henry George's classic, *Progress and Poverty*, in 1880, the Association invited various authors to write essays which would relate his philosophy and economics to conditions prevailing today.

The Association was incorporated on 23rd June 1969 and began activities during April 1970.

Its objects are the promotion and advancement of learning in the field of economics and social philosophy by research, by sponsoring study courses and by publishing research and discussion papers.

T H E A U T H O R

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C O N T E N T S

P R E F A C E

IT IS COMMONLY ASSUMED that there is a conflict between economics and ecology. What is implied is that our resources are being exploited on a purely economic basis and ecological considerations are ignored. However, this need not be so. In the first place, governments already have wide powers to dictate land use and if land is exploited for its highest economic return and at the expense of the environment, it is hardly the fault of business interests, but rather the fault of government. All this, however, is to accept that there is a necessary conflict; that the interests of business men cannot be reconciled with those of environmentalists; that the government must favour one side or the other - or reach an unsatisfactory compromise.

Mr. Rauch, in this essay, demonstrates that there need be no conflict of interests if the right fiscal policies are adopted - and thus no need for an unsatisfactory compromise or for the government to come down firmly on one side at the expense of the other.

Fiscal policies are devised not merely as a means of raising revenue; invariably there is an economic objective being sought when fiscal policies are implemented but, whether or not such is the case, economic consequences do invariably follow in addition to the simple extraction of tax. These economic consequences may either harness the self-interest of the person or corporation taxed, or be antagonistic to them. The key to reconciliation lies in harnessing the self-interest of both sides.

Mr. Rauch gives many examples of environmental pollution - using the term in its widest sense - and examines the economic consequences of its prohibition and of de-pollution.

He argues that anti-pollution measures can produce positive economic benefits that can be costed quite apart from the social advantages implicit in such measures.

March 1980 V.H. BLUNDELL

I P O L L U T I O N - W H O P A Y S ?

IN parts of the developed world, many people are complaining bitterly because environmental restrictions have reduced employment opportunities through cutbacks in production. In some places, requirements for assessing environmental impact have retarded and cancelled well-publicized plans for expansion of jobs and output. In other places, job expansion has depended on the flouting of environmental protection codes. These conditions of trade-off exist because of the different demands of those who prize economic growth and those who prize environmental integrity.

More such trade-offs loom if limits are placed on growth so as to preserve nature-rich areas and conserve non-renewable resources. In the trade-offs between economics and ecology, both sides have legitimate claims for positive social action that would help to fulfil their aspirations toward the good life. If one side is favored at the expense of the other, tensions may develop that could damage the delicate network that keeps members of the advanced societies in political harmony.

The early skirmishes in the economics-ecology conflict have not yet produced acceptable proposals for coping with this uneasy situation. Perhaps beneficial ideas can arise from the application of Alfred North Whitehead's observation that great achievements have come from a willingness to analyze the obvious.

Consider Tonawanda Creek as it flows through western New York State. On its way to the Niagara River, it collects inadequately - treated sewage, phosphates, fertilizers, industrial waste and pesticides. The poisons going into the creek make swimming dangerous and fishing worthless. The poisons foul nearby wells and make boat maintenance more difficult.

Suppose all polluters were impelled to stop their polluting. How would the costs and benefits of pollution-abatement be distributed? The first burden-carriers have to be the polluters because of the cost of changing processes, of installing abatement equipment or of neutralizing noxious waste products.

Pollution-abaters with something to sell are likely to try to pass their

increased costs on to their customers by raising prices. Demand by these customers at abatement-affected higher prices could be elastic and fall. Customers would suffer from abatement by being deprived of supply at cheaper prices. The cutback in output would make some labor and some capital redundant. Suppliers of the displaced labor and capital are likely to flee pollution-regulated sectors, if their economic distress cannot be alleviated by low cost adjustments. The flight of capital and labor from any area has to make land values in that area go down.

If demand for pollution-abaters' products were inelastic, that is, if first-stage customers accepted higher prices by buying at previous levels, pollution-abatement burdens would fall on first-stage customers. The customers of pollution-abaters are likely to try to pass along their increased costs to their customers and so on down the economic ladder to final consumers. Somewhere in the course of the "pass along" game, some of the players may not be able to pass along the added costs originating in pollution-abatement. The unfortunate accepters of the final cost burdens of pollution-abatement will have to rearrange consumption and production plans downward. The associated labor and capital will have to move, literally or economically.

Regardless of demand conditions, some customers of pollution-abaters will join them in carrying the burden of pollution-abatement. When these burdens are insupportable or non-transferable, capital and labor will move from one site or use to another. Sites adversely affected by ecological encumbrance must experience a fall in values or a retarded rate of return.

The conjectured cessation of pollution in Tonawanda Creek would confer a considerable economic gain on at least one group of people. This group comprises property-holders downstream from the polluters. With no expenditure of effort or money, they would find their property values rising considerably. The real-estate market would capitalize into higher land prices the presence of an enhanced environment for swimmers, fishermen, boaters, picnickers, etc.

The general effect on property values of changes in the state of pollution can be no different from the often demonstrated effects of changes in social conditions surrounding human enterprise. If access, policing, fashion, regulations, demand, population, and so on, undergo change, there must be corresponding changes in opportunities, to achieve satisfaction. Where markets are reasonably free, changes in opportunities must produce proportional changes in demand for some or all kinds of land. This change in demand must eventually be expressed in land prices, some going up and some going down.

Human affairs are so rich in detail, variation and complication, that they overwhelm those who try to discover how and why things happen. In the interest of mental economy, thinkers are forced to separate human affairs into manageable categories. In many cases separation and classification of phenomena is distinct. In some cases, there is enormous overlapping. How much separation exists in reality between economics and ecology?

One of the truisms of the ecology movement is this: everything is connected to everything else. Everything else must include economic phenomena. A parallel truism of the body economic is: the cost of anything depends on the cost of everything else. Everything else must include the cost of the air we breathe and the cost of the water we drink.

These truisms are evidence that both sides in the ecology-economics conflict are aware of essential inseparability. Despite the sense of interdependence both sides seem to be seeking separation in thought that will justify giving one side ascendancy over the other. Both sides should, instead, be seeking a principle of reconciliation or mutual enhancement. Analysis of the obvious suggests that the needed principle involves land values.

II EFFECT OF POLLUTION ON LAND VALUES

SOME people conceive of land value as being simply the price that inspires the transfer of land titles from one person to another. In this conception, land may be said to function as a specialized form of capital meriting treatment as a commodity with its price determined solely by supply and demand.

Increased demand for commodities usually provokes increased supply. Since land is fixed in quantity, increased demand cannot bring increased supply. Nor can falling demand decrease the supply of land. Categorizing land as a commodity and defining land value as the price of that commodity cannot be considered a sufficient description of what happens in the real world.

Supporters of the conception of land as commodity, argue that the price is always right when set by supply and demand. Any interference with supply-demand action must be deemed as a deterrent to social progress. How can such a rigid proposition admit of ecological concerns without subverting the proposition?

Other people regard land pricing as a process, as a means of calculating the many factors, public and private,that make land useful. The process of land pricing through free bargaining is an operation for arriving at figures that express the productive use value of particular sites at a given time under a given set of conditions.

In this second conception, productive use sets the limits of rise and fall in land values, with final figures refined by supply and demand. This conception provides a convenient calculus for predicting and measuring the economic consequences of any factor bearing on land use. Ecological concerns immediately fall within the sphere of this calculus.

Many people who seek to promote the general welfare, argue that this goal is well-served when land gets its best and highest use. They further argue that the most economically sensible use of land usually occurs when a site goes to the person who can pay or generate the most ground rent. Unfettered use of land is now a thing of the past. Environmentalists have sensibly pressurized legislatures and regulating agencies into asserting this permanent proviso. Other people and other sites must suffer minimal damage from the highest and best use.

Suppose that, prior to any confirmation of land tenure, a maximum value were established for each site either by appraisal or by public auction, as conditions warranted. Let site tenure by government be granted or maintained from payments determined by maximum site value. A site cost so determined, may be deemed a positive opportunity cost, because the cost to a willing user must be reasonably proportional to the locational benefits received by the user.

If compelled to erect pollution-abatement equipment, site users would be turning capital funds from a productive use to a non-productive one. Such diverted funds lack direct earning capacity. Capital funds made non-earning by compulsion may be justly classified as negative opportunity costs.

It is well established that positive opportunity costs in the form of ground rents or land values are never passed on to customers in the form of higher prices for goods enjoying directly the benefit of location. It has also been established that pollution-abatement costs, as currently imposed, are almost always passed on to customers, one way or another.

Efficiency in the use of resources requires the keeping of opportunity costs at a level that provokes the highest and best use of land.* The next step in getting the needed ecological-economic coordination tool is this: use the growing discipline of technology assessment in cooperation with accepted accounting practices to find a rational method of defraying the costs of deploying properly imposed pollution-abatement techniques.

By this time, technology assessment should be able to provide a feasible set of requirements for environmental protection in all kinds of economic enterprise. If conditions for site use are severely restrictive, the advantage to particular users of particular sites must be lower than under conditions of little restriction. When land users calculate their chances for a successful enterprise, they will translate restrictions into lower opportunity values and bid less for land tenure. How low will the bids fall? In a reasonably competitive market for land, bids for land tenure would vary by amounts that depended on the perceived costs of environmental code conformity.

As a condition for maintaining land tenure, existing and potential polluters would bear the initial costs of erecting environmentally-governed production facilities. How do we keep these costs from being punitive costs that will either lower production or raise prices? By remembering that opportunity costs may be divided into two classes.

Final site tenure costs would be based on the summation of the two pertinent kinds of cost. One would be the periodically revised maximum annual value of the site, the positive opportunity cost. The other would be negative,

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* The highest and best use will of course be subject to highest *permissible* use.

the annually amortized cost of introducing pollution-tempering structures into production facilities. The negative cost should be set by a free market negotiation between firm managers and technology assessors.

Tenure would derive from payments based on the net annual opportunity cost. The final figures would essentially come from highest-use site value minus amortized costs of compliance with environmental codes. If, in the absence of ecological rules, opportunity costs were such as to permit and encourage the maintenance and expansion of jobs or output, then they must remain so in the presence of ecological rules.

III POLLUTION ABATEMENT AND ECONOMIC INCENTIVES

THE proposed plan for efficient and ecologically-sound use of land would carry a crucial protection from a kind of competition that could subvert the actions of an economy seeking a wholesome environment. Enterprises bound by ecological rules would have marginal costs essentially equal to those of enterprises not bound by ecological rules. No enterprise would have higher costs under jurisdictions seeking environmental integrity than under jurisdictions that did not require pollution control. Environmental codes would never provoke capital flight.

We need to ensure that opportunity costs remain at incentive levels in the long run as well as in the start-up period. There should be an end to the practice, current in many places, of putting extra burdens in the form of tax penalties on producers who put up pollution-abatement structures. These structures are too often classified as capital improvements and taxed as such. Taxes on installations designed as pollution-abatement facilities should be zero.

Some of the early burdens of pollution-abatement would fall on taxpayers in local tax jurisdictions surrounding enterprises that operated under the proposed conditions for land tenure. The revenue to local government from ecologically-constricted enterprises would fall. If local services remained the same, neighboring taxpayers would have to make up the deficit.

This deficit-derived burden of higher taxes on neighboring properties would be equitable. Property-owners would be paying for benefits received in the form of pollution-abatement. This financial burden would be compensated for when the properties were sold. The real estate market would capitalize the virtues of living in a better location into higher selling prices.

Environmental improvement is likely to increase output and employment in the construction trades. Many areas, now slums, have easy access to good roads and are close to amenities and work sites. Many of these slums became slums because of pollution-poisoning. Pollution-temperance is sure to provide many slum areas with the best stimulus to renewal there is - enhanced land values.

The more sites in use, the larger the effective tax base. A wider tax base would compensate for any loss in revenue from industrial operations paying taxes derived from net opportunity costs based on the ecology-land value interaction.

Taxes based on the ecology-land value interaction can be expected to possess a "ripple" effect that should expand in proportion to social need. This will show that the power to tax can be creative as well as destructive. It must be stressed that the creative or constructive element in any kind of taxation can come only when the tax mode suppresses neither equity nor efficiency.

Pollution and pollution-abatement cross tax boundaries. A problem in equity would arise when the costs of pollution-abatement were borne in one tax area and the benefits therefrom accrued to another. The solution to this difficulty depends on what may be called the "decartelizing" of taxes.

Customarily, taxes on land and buildings are allocated to small political divisions - cities, villages, townships and counties. Income taxes are allocated to central government and (in some countries) to provinces and states. Taxes on consumption (sales taxes) are grabbed by taxing authorities with sufficient political daring.

The interest of economic-ecological peace requires breaking the tax cartel. The larger political entities must some day come to use land values, in part or whole, as the proper basis for allocating tax burdens. When this is done, complete equity may be provided in environmental cost-benefit accounting.

The effects of pollution and pollution-abatement are not limited by national boundaries. High smokestacks are used in England to put gases and particulate matter into upper wind patterns so as to protect factory neighbors from smell, dirt and lung irritation. These stacks are so effective that heavier-than-air pollution from England comes down in Sweden. Many American smokestacks have "scrubbers" to remove sulphur compounds and other particulate matter. Who should pay the cost of putting scrubbers in English smokestacks?

IV ECOLOGICAL EYESORES AND DISPOSAL OF WASTE

THE proposal to use more coal for industrial processes and for electrical energy in the United States has provoked a great deal of environmental agonizing. Most of this agonizing derives from the expansion of surface strip mining in the western states where low sulphur coal is available at reasonable cost. The ecological worry lies with the ravaging of vast estates by giant earth-moving equipment.

Under present regulations, strip mining in the west of the United States goes on with surcharges as high as thirty per cent applied to each excavation measure. These surcharges are supposed to pay for land restoration. Unfortunately the surcharge system functions as a license sold to coal operators allowing them to despoil the countryside. Restoration now proceeds at a painfully slow pace in Montana and Wyoming, where the surcharge system is in force.

In the United States, when intervention by government fails to achieve its stated purpose, the explanation that usually prevails is: "The ineffective procedure is not wrong. It was applied with insufficient force." This attitude now prevails with respect to land restoration. This suggests the imminence of higher surcharges that will be passed along to coal buyers. Final costs per unit of energy may rise to the point where the benefits of switching from oil to coal will vanish.

If a television advertisement by the Gulf Oil Company can be believed, there is at least one strip-mining site with land restoration proceeding in a satisfactory manner. Apparently appropriate technology for land restoration is at hand. Unfortunately, not enough use is made of this technology.

If Americans want more non-polluting coal without a lingering uglification of the landscape; if they want to avoid damage to watersheds and soil-holding formations, they should let restoration costs be offset against site costs in the same manner as that suggested for letting pollution-abatement costs be offset. Under cost-offset conditions, coal operators could lose more by not putting land back to good order than they could gain. Why? With

restoration there would be low cost title to land rendered suitable for other uses such as grazing, forestry, agriculture and recreation. Intelligent "second growth" can be as good or better than "first growth".

A situation rapidly growing more serious lies in the disposal of waste from industrial processes and sewage treatment. The quantities of waste are now so great that the self-cleaning properties of air, water and soil are inadequate.

The first imperative in waste disposal involves the neutralizing of noxious materials. When done chemically, burdensome sludge remains, creating an enormous storage problem. Sludge disposal is practicable only when the sludge may be placed on land of little consequence. The current demand for land for productive use has pushed the margin way down, leaving little submarginal land suitable for sludge poisoning. Dumping sludge into the sea is no solution to the problem. Sea-dumping substitutes one class of ecological problems for another. Perhaps we should send all waste to Antarctica.

Some firms prefer to incinerate their waste even though initial costs are higher than other waste-neutralizing methods. The residues are smaller and presumably more easily disposed of. Ashes can be hauled to smaller landfill sites. But landfill has problems akin to land restoration. Ashes are not always harmless, especially to water tables. Special considerations are needed not only where pollution is born but also where pollution end-products are laid away.

Where firms carry out their own waste disposal, the operation, geographically, is a two-site operation. For ecological-economic needs, the disposal site and the productive site should be considered as a single-site operation. Costs at the disposal site can be used to offset costs at the productive site. In that way, damage to productivity as measured by final costs will be slight.

Waste disposal, as a one-site enterprise, needs special treatment. If disposal sites are necessarily low-value sites, how can ecologically-ordained costs be offset? The net result of adding positive and coercively negative opportunity costs will be a negative figure. Can negative site values receive realistic treatment? Yes, if we look at negative site values as having an existence comparable to the square root of minus one - existing only in the computations needed to go from one point in reality to another.

The exponentially growing problem of waste disposal is one that may require outright subsidy payments to disposal firms rather than tax abatement. The justification for subsidies in this case is the protection of supermarginal land from contamination that can migrate from submarginal disposal sites. The subsidies would function as a means of converting negative site values to positive values sufficient to command sensible economic activity.

How should waste disposal subsidies be financed? Should the funds come from the general treasury? It would be most sensible to have disposal financing come from a special treasury fund that would arise from land values enhanced by environmental protection. If subsidies were fixed by competitive bidding for disposal contracts, the use of earmarked environmental funds would constitute a recycling operation compounded of equity and efficiency.

Closely related to the problems of land restoration and waste disposal is the problem of what to do with smelting slag and mine tailings, the residues from rendering raw ore into valuable material. In some cases, mountains of tailings create eyesores. In other cases, dangers lurk from such phenomena as acidic run-off.

In Wales, not so long ago, a mountain of tailings was disturbed by bad weather. An avalanche of tailings killed many children and destroyed much property. Such tragedies would be unlikely if ore extractors knew that every penny spent on waste control to protect people and property would be redeemed by lower opportunity costs.

V SITE VALUE AND THE NUCLEAR PROBLEM

IN England, France, West Germany, Holland, Japan, Switzerland and the United States, protests against the use of nuclear fuel to generate electricity have varied from law suits to demonstrations. Some of these demonstrations have escalated to full-scale riots. The strenuous arguments for and against nuclear energy need no recapitulation here. It is enough to stress that the arguments pro and con are so hyperbolized that it is very hard for concerned people to decide what to believe about the efficacy of safe nuclear power and the comparative merits of other-than-nuclear sources of electricity. Both sides in the nuclear controversy seem angry enough to resort to major force rather than wisdom in order to settle the issues of how to meet growing electricity needs.

Forty-five countries now use or are getting nuclear power. Environmentalist success in retarding nuclear expansion exists only in those countries that feature broad-based decision-making and possess high-output, power-hungry technologies. Where decision-making is oligarchic, there is no tolerated opposition to nuclear power. The oligarchic countries are sure to use more nuclear power and may gain economic ascendancy thereby. Would the affluent, free countries remain affluent and free if they conceded the use of nuclear power to the unfree countries?

The continuous presentation of argument by both sides in the nuclear controversy functions as education to the layman in up-to-the-minute technology assessment. Since environmentalists at present reject any use of nuclear energy, the burden of devising nuclear safeguards rests on the engineering imaginations of those engaged in plant design. The devisers of safeguards, consciously and unconsciously, are constrained by cost-benefit analysis. The naysayers to nuclear power are not so constrained. They seem to have unlimited license to "cry havoc". Successful inhibition of nuclear power growth requires the supplementing of emotional appeal with hard data. Whatever the thrust of their current data, environmentalists' complaints cannot be ignored in arriving at safeguards.

If the net site-costs method of tempering pollution were applied to nuclear technology, both sides would bear pressure for offering design proposals that include cost-benefit analysis of radiation safeguards. A great expansion in mental power would be applied to the task of devising safeguards.

The suppliers of nuclear power would be more open to suggestion by their opponents, because suggestions, if adopted, would not bias costs in favor of competing modes of generating electricity. Those fearful of nuclear holocaust would have all rational misgivings placated.

Fair competition among the competing modes of generating electricity is one of the virtues of net ecology-opportunity costing. Consider this: radiation levels near operating coal-fired plants are far greater than those near any nuclear plant. If the same levels of radiation were insisted upon, the attendant costs of scrubbing atomic-sized particles might create an unwarranted prejudice against coal-fired plants.

Important human cost factors would also be covered in a fair manner. Decision-makers could demand competitive sickness, injury and death rates per unit of energy, from mine to wire. Any unexpected cost bias that could develop would be immediately neutralized.

Of great importance are long-range considerations. Hazards not foreseen by current technology assessment may show up after all-out production of nuclear facilities. Counter-measures could be easily incorporated into existent procedures without disturbing the part of economic efficiency that depends on predictable costs.

The proposal to build a nuclear plant in the San Joaquin Valley of California would be a good test of how well nuclear power expansion can be sensibly organized in terms of the ecology-land value procedure. Nuclear power plants require large sites with easy access to large amounts of water. Sites suitable for nuclear use can never be circa-marginal. The sites must be reasonably high in value.

The San Joaquin Valley has a vigorous, wide-ranging agriculture based on large scale irrigation using imported water. Site values have been competively calculated. All the economic and environmental factors are available for a precedent-setting operation in the safe siting of low-cost nuclear power.

If the security of nuclear power production and nuclear waste disposal could be truly established, there would be no need to site factories, farms, businesses and homes at excessive distances from nuclear operations. A minimally-sized "cordon sanitaire" would mean better land use, conservation of scarce resources and lower costs of supplying ancillary services.

Site values near cost-efficient power plants are sure to go up with easy access to cheap electricity. This would increase job opportunities and production potentials. People and firms would scramble to take advantage. If communities with jurisdiction over nuclear plants captured increased site values and applied this revenue efficiently to public needs, it is likely that there would be a big net gain in social welfare.

VI ECONOMIC GROWTH AND FINITE RESOURCES

A GREAT many knowledgeable, articulate, influential people are pressurizing policy-makers to put limits on growth, to reduce encroachment on wilderness areas and to conserve non-renewable resources. A major argument of these influential people goes, "We have an obligation to protect the needs of future generations." Why should one generation that can receive no benefits from another be obliged to provide benefits to the other? This is a maddeningly moot question best left unanswered because there seems to be no rational answer. The pressure to inhibit growth is very real despite the fanciful nature of one motive of those seeking limits to growth.

Policies responsive to the pressure for retarding growth can only aggravate the tensions between those who have enough of the artificial niceties of life and those who seek more. Is there a way to satisfy the wants of both factions? This question can be answered only with a question. If limits are put on the rate of resource depletion, will there necessarily be limits to growth in employment and output in material goods?

With the help of technology assessment, we can develop a schedule of retarded resource use that presumably protects the imagined needs of future generations. Retarded resource use means lower output of virgin metals and reduced efficiency as measured by the consequently higher marginal costs, the costs of producing the last unit of production. Low employment for many people and the idling of misallocated capital would follow.

If depletion rates are set sufficiently low, marginal costs of virginal metal will rise above the marginal costs of marketing recycled metal. Entrepreneurs would respond to these conditions with drastic expansion of metal salvage. Capital and labor, in response to marginal costs, would flow from virginal metal sectors to recycling operations. Familiarity with the product would conduce minimum shock to the participants in the changeover.

If the net site-value procedure for imposing environmental codes were applied to the recycling sector of the economy, producers would enjoy competitive profit-making with minimal boost in prices. The combination of fair opportunity costs and an enormously expanded market for recycled metal would provoke expansion in research, development, capitalization and employment in the recycling sectors.

If the net site-value procedure for imposing environmental codes were applied to virgin metal sectors suffering from low depletion rates, remaining producers would also enjoy competitive profit-making with minimal boost in prices. Competitive profit-making would dissipate any inclinations of virgin metal producers to cheat on allowed depletion rates. Presumably this would remove the need for a costly or corruptible bureaucracy to police producers. Competitive profit-making would be conducive to self-policed observance of co-existing pollution and land restoration codes.

It has been said that virtually all the gold ever mined is available for new use. Most other metals have lesser degrees of stability than gold, but there is surely far more available for salvage than is being salvaged. The low level of salvage undoubtedly originates in a cost-benefit balance that favors the use of virgin metal.

Some people argue that metal production at the "right" prices is one of the key determinants of economic growth. If salvage of scrap metal and recycling into usable product proceeds at maximum feasibility, we can expect metal in sufficient quantity at right prices in good enough time to continue the rate of growth in accord with popular desire.

Science fiction writers have bragged that what some of them imagined has come true despite the ridicule heaped on them by contemporaries. Let us imagine a coherent interaction among ecological needs and economics based on net opportunity cost accounting, expanded recycling, increased energy production from coal and nuclear fuels, sound money, use of new and existing technologies hampered only by realistic environmental consideration, a bit more ardor in work habits and a dispersal of the overburdening special privileges conferred by government. If all these currently feasible activities received the necessary political blessing, would there be a need to worry about future privation? Can social science imagining come true, too, despite being out of step with contemporary thinking?

Material production comprises a breaking down and building up of indestructible matter. If we had a rearrangement of these processes based on the harmonization of equity and efficiency, we could expect the appropriate economic growth that suits the aspirations and work patterns of the individuals who make up the abstraction called society.

VII LAND USE PLANNING

THE United States government provides income tax credits to firms that construct pollution-abatement equipment. This method of stimulating environmental improvement is defective in two crucial aspects.

The income tax credit method ignores "full cost pricing", the operation used by almost all firms in a free economy to set prices. When all costs have been averaged in the manufacture or marketing of a product - labor, capital, raw materials, opportunity costs, indirect taxes, interest - a firm will add a percentage mark-up to the average cost of the product. Mark-ups vary from industry to industry but are usually stable within a single industry. Mark-ups are stable because they are derived from many years of experience in the balancing of the profit-seeking of firms and the satisfaction-seeking of customers.

Market uncertainty tortures all private enterprise. The possibility always exists that there will be no profit to be offset by an income tax credit. Prudent pricing minimizes losses when it does not maximize profits. This means the cost-averaged base for marking up to selling price will tend to be the same with and without the presence of income tax credits.

If net opportunity costs prevailed as herein proposed, the cost base would be lower before the application of mark-ups than with the use of income tax credits. Real world competition would make this be true.

The use of income tax credits to offset pollution-abatement costs ignores the chain of benefits that derives from the removal of pollution. A firm downstream from a water polluter will have lower costs after abatement than before, if relatively clean water is important to downstream operations. The system of income tax credits allows benefiting downstream firms to reap unearned, after-tax windfall profits.

As noted before, when the facts of abatement become known, site-value downstream from ex-polluters must rise. Taxing site-values commensurately with benefits received by site-holders would enable the community to receive payment for benefits created by the community in the form of pollution-restraint. Site-value taxes prevent windfall profits as a matter of easy routine. Income taxes can collect windfall profits only as a matter of uneasy contrivance. Which taxing system should be preferred?

In many regions all over the world there is considerable development of land subject to periodic flooding. In the United States, much loss of life and severe property damage accompanied the floods that followed the heavy snows of 1976-77.

The American response to flood damage is similar to United Kingdom policy-palliative rather than preventive. Disaster relief, low cost rebuilding loans and subsidized insurance against new flood damage were provided by government. These measures are invitations to new castrastrophe. Many people are bound to use this virtually costless protection from their own foolishness as incentive to return to areas that continually face the risk of flood (or landslides or forest fires etc.)

There are a significant number of people who decry flood plain use. They plausibly argue there should be no homebuilding where the expected frequency of flooding is greater than once in a hundred years; no industrial development where the expected flood frequency is more than once in twenty years. Can these justifiable proscriptions be put into practice in ways that enhance community welfare without degrading many individuals' aspirations toward the "good life"?

Purist believers in the free market would suggest this course of action about flood plain use: instead of coercively taking flood plains out of use, governments should make repeated, ringing declarations that no disaster relief will be given to flood plain users. People with notions about flood plain use would have to reckon with the high costs of flood-resistant improvements, the prohibitive costs of private insurance and the great risk to life and limb. Virtually all prospective users presumably would judge that negative factors outweigh positive benefits. Flood plains would be conspicuously labeled as submarginal. Even though title would obtain at near zero costs, flood plains would stay out of use except for activities like hunting, trapping and mushroom gathering. The free market would supply self-regulating disuse, provided the underlying assumption is correct that virtually all actors on the economic scene are rational maximizers of self-interest.

The free market approach has little chance of adoption. Rationality is nowhere near ubiquitous. The harmful consequences of irrationality too often damage the innocent. There is this geographical fact of life. The sensible use of one piece of land often depends on the sensible use of other pieces of land, sometimes miles and miles apart. Erosion control and the maintenance of water sources are but two examples of the dependency of site upon site. Intervention in the free market with planning by experts cannot be avoided in a properly operating system of land use. But planning cannot be left solely to the technological dictates of planners.

Land-use planning requires zoning, coercive restriction of land parcels to specified forms of use. Zoning always sets brakes on growth by distorting many well-appointed production schemes. If restraintson improvement cover sizeable territories, fewer sites must be available for homebuilding and factories. Under conditions of restricted land use, the costs of acquiring raw sites and existing installations must rise. This

would hurt buyers and confer unearned benefits on sellers. This iniquitous distortion of the terms of trade would favor sellers over buyers. Sooner or later, this unbalanced bargaining power must work against efficiency in supplying consumer wants.

If zoning against unwise land use is to dissipate more problems than it creates, zoning must be accompanied by rules of tenure comparable to those suggested for pollution control and conservation of resources. All sites subject to zoning should be tenured through the payment of rates (taxes) based on up-to-the-moment full market value. Unearned benefits from zoning would vanish. Balance would be struck between prospective users of land and yielders of title thereto. Sites would transfer at reasonable costs. Then the free market would show its powerful ability to please, and render innocuous the putative limits to growth due to zoning, with such devices as cluster development, country-sited town houses and imaginative multiple-dwelling design.

Most planners seem to give greater consideration to matters of efficiency than to matters of equity. Few planners understand that equity such as tenure-through-site-value has the inherent capacity to provide time-oriented efficiency.

Good planning must include specified times for fulfilment of plans. The required times for plans to reach goals must be predictable. The shorter the time for fulfilment, the better. With shorter terms of fulfilment, there must be fewer unforeseen changes in circumstance and a greater probability of adherence to plan according to predicted costs and benefits. When the unforeseen does emerge, shorter terms make plan revision easier. By lowering costs, tenure-through-site-value must confer a wholesome degree of speed on plan fulfilment.

In the problem of flood plain use, tenure-through-site-value payments presents a pleasantly paradoxical aspect. Tenure-through-site-value can enhance the prospective resolution of the problem in either of two ways that seem to be antagonistic ways of problem-solving.

Long before wilderness protection acquired its current "chic", the English set up "green belts", areas of naturalness close to developed areas. The many benefits from green belts should not make us forget holding good land from use means less for homes and industrial purposes. Can the highly desirable creation of green belts be made to serve the general welfare better than it does now by using the suggested land-value-ecology proposal?

A modification of technique is needed to apply tenure-through-site-value payments in the greenbelt situation. People who live close to green belts get long term benefits appreciably greater than those who live further away. Those passing through get short term benefits where the cost of measuring and collecting benefits is likely to be greater than possible revenues. The situation calls for the setting up of green belt taxing districts. Cost of green belt maintenance would then be apportioned in correspondence to benefits received. As in the case of zoned disuse of land, prices of land would stay reasonable because no bias would obtain favoring sellers over buyers.

VIII N O I S E P O L L U T I O N

POLLUTION comes in many forms. Noise is an insidious one that merits intervention by government into free market activity. Noise from motorcycles, jet aircraft, metal stampers and compressed air hammers can damage the hearing of innocent bystanders, disturb their sleep and create considerable tension.

Some people think there is always a need for better silencers (mufflers) on motorcycles. Such justifiably imposed costs would have to be borne by motorcyclists. The mobility of the noisemaking forbids any other action. Because less noise would help most motorcyclists, because silencing improvement would not be too costly, because motorcyclists have permission to use public roads, arbitrarily ordaining lower decibel limits for silencers is a forgivable denial of individual pursuit of happiness. Similar considerations exist in the use of compressed air tools for construction work in streets and on buildings.

Lower noise from jet aircraft is a restraint that has considerations different from motorcycle noise. The odium of jet motors may be subdued by better motor silencing and by changed flight patterns. Both ways have increased costs that are mitigated by lower income taxes when charged against operating revenue or capital depreciation. Can these accounting procedures sufficiently soften the impact of the improved silencing standards now being demanded?

In many technologies, early improvements often have relatively low costs. As further improvements are sought, there frequently is a rise in costs that outpaces the degree of gain. If people in general want more reduction in aircraft noise, they will have to recognise that the extra burden on air travel expenses may not be sufficiently allayed by income tax deductions. Does the mobility of aircraft forbid the use of the ecology land value interaction?

Increased jet motor silencing can be equitably and efficiently promoted through airport costs. Most commercial airports are enterprises subsidized by government. Some people would argue that aircraft silencing does not merit further relief because subsidies provide traffic control, lower

hangar rentals and reduced departure fees.

The interaction between environmental concerns and land values may be put to good use whether or not airports pay their own way. Airports raise land values for commercial establishments. Aircraft noise lowers values for residences. Airports should be set up as the core of a special taxing district. The boundaries of the tax district would depend on the points where noise levels need no special manoeuvering by aircraft.

If tenure were made dependent on site values, increased values in the airport district because of lower noise levels would flow to the district treasury. The district treasury would also draw revenue from the values in commercial property that originate in airport proximity.

Operating revenues of airports would then be combined with airport-induced site values. The balance of total revenue versus costs could possibly allow airports to function without subsidies. Or this increased revenue could be used to lower charges to airlines for use of airport facilities. If this situation obtained, there would be equitable compensation for improved silencing of jet motors. Lower operating costs could mean lower fares and higher passenger loads. Efficiency would go hand in hand with equity.

IX SUBSIDIES AND THE POLLUTERS

NOWADAYS most of the censure for polluting air, water and soil falls on private enterprise. Much of this censure is deserved. Some of the censure is not. Strongly deserving of censure are people living in communities that allow untreated sewage to enter water courses. Many of these communities in the United States chose to delay implementing their responsibility for sewage. The spokesmen of these delinquent communities made use and make use of an American tradition, pleading or pretending hardship and entreating their Federal or state governments to supply the wherewithal for local projects.

The Federal government and many state governments responded to these pleas with large grants to municipalities for building sewage treatment plants. In all or most cases, outside contributions exceeded local contributions to the costs of sewage plants.

In the United States, Federal and state aid to selected communities is usually pressured into becoming aid to all communities. The net effect is to have funds for local activities move from the individuals in local communities, turn around and go back to the local communities. Unfortunately the cost of the round trip transportation for these funds is likely to be very high. Evidence for this expectation comes from America's famous "War on Poverty". The bureaucrats running the war benefited more than the poor.

It is quite clear that any social operation under the command of appointed public officials runs a risk of being distorted by the by-products of bureaucracy. These by-products include enormous paperwork, irksome delays, excessive administrative costs, the possibility of corruption and many actions detached from the will of the people.

If we handled the war on pollution in terms of the ecology-land value interaction, provision must be made for nipping bureaucracy in the bud. A crucial requirement is the creation of special treasuries to collect the funds derived from cleaning up the environment. Treasuries are needed on the state and national levels to handle the fact that pollution and its abatement recognize no political boundaries. If most of the funds went into local treasuries, under local control, there would be little round trip money

leakage into counter-productive hands.

The funds in these special treasuries must be used only for activities connected to pollution-abatement. Some of these funds may be lent, at proper rates of interest, to communities pleading poverty. The redemption of loans for pollution treatment plants should come from two sources. One would be the earmarked charges for sewer use, now a part of local tax structures. The other source would be the sites made more valuable by sewage treatment. Costs and benefits would be apportioned appropriately. Within a short time, sewage treatment could become a self-financed, self-sustaining process with simple procedures that need no self-serving bureaucracy.

Earmarking all pollution-abatement revenue would automatically facilitate monitoring of the collection and disbursement of funds. State and national treasuries would be relatively more visible because of isolation from general treasuries. Their small size should make auditing easy.

More monitoring ease would come by putting most of the funds into local treasuries. The intensity of school budget scrutiny in the United States offers evidence of this likelihood. Having equity and efficiency conspicuous in the pollution arena might set a good example for imitation in other arenas of public action.

X PRICING NEGATIVE SERVICES

THE problems of pollution and resource conservation are part of a broad class of phenomena called externalities in orthodox micro-economics. Externalities may be defined as actions to, for, by or on the participants in production and consumption that bear no prices. Since micro-economics is essentially a study of price behavior, any economic transaction that carries no explicit price is considered outside the ken of orthodox micro-economics.

The classic example of externality lies in the presence of apple orchards next to separately-owned beehives. Apple blossoms supply food for bees; bees pollinate apple blossoms. Without these reciprocal services there would be neither apples nor honey. No prices are put on the services rendered. Therefore the services are externalities.

Polluters provide negative services by soiling the curtains of housewives. No price accompanies this transaction. Pollution is thereby deemed an externality. Polluters force water departments to modify their purifying processes in terms of the pollutants provided. Are these negative services really unpriced?

The contiguous presence of apple trees and beehives raises site values for apple growing and honey gathering. Pollution lowers site values for home-building and for productive activities that depend on clean air and water. These externalities may exist in thought as being outside day-to-day economic events but not in reality.

Orthodox micro-economists regard technological change as another phenomenon that belongs outside the reach of economic reasoning. That is why the mental exercises of most micro-economists invariably include the assumption of no change in technology. Is it sensible to deem technology an externality if its purpose is always the pursuit of economic enhancement? Would the development of plant derived, competitively priced alcohol as fuel for motorcars be an externality? How could something be more internal to economics than a process capable of depriving the oil cartel of the power to make economies tremble?

Copying machines and automatic typewriters reduce the need for large typing staffs. This means that head offices are no longer confined to cities where lie the requisite labor pools. Land values, in many central cities are down for office work; in the suburbs values are up. The migration of so many head offices shows the reality of this situation.

Pollution and technology are but two of a large number of phenomena relegated to the limbo of externality. The obvious importance of such phenomena makes such action bewildering. In the real world, the mental construct of externality lacks application.

Although the term externality can mislead more than it can enlighten, we are stuck with it. It may be used to refer to economic phenomena that have no explicit transfer price provided one remembers the probability of most of these phenomena as being priced as components in opportunity or land values.

It is time we had universal recognition of the remarkable capacity of site valuation to collect and price externalities. Besides technological input and ecological interaction, land values sum up the prices of cultural attitudes toward work and leisure, demographic trends, public works, the rules of land tenure, law and order, public regulation, education, aesthetics and more. If not already done, it should be rather easy to set up a computer program to price each factor that bears on land values.

Using net opportunity costs to end the trade-off between economic growth and ecological integrity is an exercise in the internalization of externalities. Most of today's social controversies involve economic phenomena that orthodox economics labels externalities. Without the full development of an internalizing process for all economic phenomena, in both theory and practice, can there be much hope for resolving the controversies that now threaten the very existence of civilized living?

The preferred social context for the use of the interaction between site values and ecological events, is the free market. Where there is a free market in land, there exists the continuous application of many minds strongly motivated by self-interest to find a reliable assay of site value.

XI POLLUTED FREE ENTERPRISE

HOWEVER vulgar or grasping may be the propensities of some free enterprisers and their clienteles; however resistant may be some business men to constructive criticism, the reality of this world clearly demonstrates that no other system comes up to the free market in economic performance.

Many outrages have been committed by economic freebooters in circumstances that can be described as free market. Some of these outrages were common law frauds and thefts. Almost all of the other outrages depended on government connivance and coercion for the commission thereof. American railroads in the nineteenth century and American public utility holding companies in the twentieth are two examples. The South Sea bubble and the activities of John Law are two more.

We must no longer fool ourselves into thinking of these outrages as failures of free enterprise. These outrages depend on failure of government responsibility, the failure to maintain the standards of justice implied by the unwritten "social contract" that is the basis of all civilized living.

If we want to promote the general welfare as measured by the material standard of living, we must protect and augment the vigor of free capitalism. If we want to maintain environmental integrity without sacrificing the standard of living, we must use operations that maximize free response to sensible regulations.

Those who want to clean the environment and put limits on growth, those who want to preserve the natural at the expense of the artificial, do so with poorly concealed zeal for crippling freedom of enterprise. If we let these people dominate the critical immediacy of social change, economic and spiritual well-being will be available to fewer people whose numbers will be determined by still fewer people.

For the most part, nowadays, most of the bearers of the costs of social change lie in the middle of the economic stratification. They make up a majority and receive few benefits from the higher living costs ordained by the elite in charge of the machinery of social change. These previously acquiescent cost-bearers are now expressing resentment in increasing volume.

They resent their unwanted burdens as now going beyond the point of equity or of sensible charity. They believe their unearned burdens are an unfair imposition on their right to a reasonable level of enjoyment of the fruits of their labor.

There is great potential for arbitrary political action, perhaps even violent, among those who cherish self-sufficiency and now chafe at the government's manipulation of their most precious affairs. This potential for coercive political action must not be underrated by those directing the course of ecological improvement.

Popular, peaceable support for better ecological practices can be generated, in the long run, only when the procedures for distributing the costs of social change are economically efficient and eminently equitable. If equity and economic output are debased in the cause of ecological enhancement, compliance to environmental codes would require increased application of force. Bullets would take the place of ballots. Could such an environment be called sane?

No nation in the world makes adequate use of site valuation to organize the economic and technological system. No nation in the world makes use of site valuation to help organize ecological improvement. In a few countries, such as Denmark, New Zealand and Australia, taxes are placed on land values to a greater degree than on capital values. There is a pertinent essay now available from the Robert Schalkenbach Foundation of New York City, by Harry Gunnison Brown, called *The Challenge of Australian Tax Policy*.

In this essay, Professor Brown shows how Australia functions as an experiment in the use of site value taxation. Some regions impose higher taxes on land than on capital; other regions apply equal rates of taxation on land and capital values. Professor Brown provides impossible-to-refute data showing the response of greater employment and output found in regions that shifted tax burdens from capital values to land values.Professor Brown's essay makes it plausible to believe that applying site value taxation to the problem of ecological improvement will operate on the economy in the manner claimed for it.

Whenever a proposal for social improvement arises that entails shifting tax burdens from human effort and capital to location values, the critics thereof often indulge in arguments that are specious because the arguments almost invariably include this kind of statement. "... just another simplistic, antiquated single tax notion from the followers of Henry George."

The proposal to use net site cost accounting to reconcile the demands of the ecology and the demands of the economy is one proof that Henry George's insight can go far beyond the matter of providing revenue for good or bad use by the bureaucracies manipulating our lives. Site value taxation is a "sine qua non" catalyzing tool in resolving the economics-ecology trade-off. The dismal failure of most compulsory operations for social improvement probably originates in the failure to take cognizance of the induced changes in opportunity values. Classifying a social operation that requires the use of site value taxation as merely a variation of Henry George's single tax can never deny its potential for promoting the general welfare.