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N. Kelso
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NATURAL RESOURCE ECONOMICS:

THE UPSETTING DISCIPLINE

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My discussion of the topic I have chosen will be more a personal testimony than an intellectual performance. I trust, of course, that my testimony will contain intellectual nourishment. It would be out of place before an august assembly of intellectuals like this if it didn't. But its intellectuality may be somewhat hidden because it will not be couched in intellectually brilliant analytics nor in soaring conceptual hyperbole. But I take comfort in Adam Smith's oft-quoted remark about the "invisible hand" and hope that the intellectuality in my personal testimony may lead you, as by an invisible hand, to new insights into your unconscious biases, hence recognition of what may be restraining unconscious assumptions in your conceptions of society and the world. I hope the result may be that you will then play leading roles in what I shall argue are imperative changes in our economic view of man and his world if we are to help our society to avoid the apocalypse.

Some 45-50 years ago I came into what then was called Land Economics almost coincidentally - quite, even, by accident. I see myself as then, a naive, idealistic, intellectual youngster who had just received his Bachelor of Science degree in agriculture, major in animal husbandry, from the University of Minnesota who had accepted a research assistantship in agricultural economics at what was then Connecticut Agricultural College (now the University of Connecticut). I was to assist in economic research in land utilization on dairy farms in the eastern highlands of Connecticut. That experience whetted my interest in, and appetite

for, study of the economics of land utilization in agriculture. The University of Wisconsin was at that time preeminent in its offerings in land economics, so I went there in 1930 to pursue graduate work leading to the Ph.D. degree in agricultural economics with a dissertation topic in land economics, minors in sociology and constitutional law, and with a sizable dose of institutional economics administered by John R. Commons then approaching the end of his illustrious career.

From the vantage point of maturity and experience, I look back on those college years and the twenty years of professional work in land economics in the New Deal's Resettlement Administration, in the Division of Land Economics of the "old" BAE in the USDA, and at Montana State College with a profound sympathy for what was then a nagging worry, sometimes conscious, more often subconscious, but always with me; a worry that concerned the conceptual and analytical relations between land economics and the accepted body and conventional wisdom of the rest of agricultural economics and its parent economic theory.

My naive idealism, born of the conventional wisdom and accepted economic dogma of the times, assumed intellectually that maximized aggregate welfare would flow from maximized individual welfare were it not for the aberrations of monopoly and monopolistic elements in the economy, the humanness of the all-too-human actors in the drama, public interference in the market system and the like. I know now that my association with those great iconoclasts, Veblen and Commons, and my experiences in the drouths and great depression of the thirties generated within me gut feelings of skepticism regarding that intel-

lectual idealism. It was, I can testify, a period of intellectual and philosophical discomfort for me. But I wasn't aware, quite, why.

I know now I was trying to accommodate my conceptions of land economics (we now call it the economics of natural resources) to the accepted body of conventional wisdom of agricultural economics and economic theory. But I couldn't bring it off. Not that I tried very hard. It was sort of like a chronic nagging discomfort lived with so long and so intractably that one sort of accepts the notion unconsciously even rationalistically that it is the natural state of things, common to all persons similarly situated, part of the inevitable burden of living -- and intellectualizing.

I came closest to resolving the paradox, or maybe more accurately said, came closest to grasping the sources of the paradox through my intellectual association with the Wisconsin institutionalists, notably John R. as we students affectionately called him, and from my New Deal experiences during the depression which, in fact, were but the application in practice of much of John R's intellectual insights though most of us, including me, didn't then quite realize it!

I well remember my first intellectual insight that brought land economics and conventional agricultural economics together in one very small way. It was soon after I went to Montana State College in 1946 as an agricultural economist specializing in ranch and public land management. That was a time of ferment among western Federal public land ranchers over their relations to the public lands, to the Federal

bureaucracy and to Federal land managers. I had been working with a Committee of the American National Cattleman's Association on the question posed naively and dichotomously by it as to whether the public grazing lands should be privately or publicly owned, the Committee biased in favor of the former because its members were "fed up" with the difficulties and frustrations of the latter. I, like the Committee, had been viewing the problem dichotomously as one or the other. I was trying to think my way through the issue in order to find some way to resolve the conflict. Emotionally I could accept the graziers' frustrations but intellectually I couldn't accept the dichotomous solution of universal private ownership of all the then public grazing lands.

One day (it would have been in 1946 or 1947) I was driving from Bozeman to eastern Montana on some mission I don't now recall. As most of you know, distances in Montana are vast, traffic in those days was light. So to relieve the boredom of uneventful hours behind the wheel, I let my mind mull over the public land problem that was so much in my thoughts. It came to me suddenly as an intellectual insight so clear that I could without much trouble, if only I were of a religious turn of mind, have attributed to divine inspiration, that what we were dealing with here was a problem of landlord-tenant relationships on the public lands vs. private ownership of those lands; that the solution was not an either/or choice between what we had and something totally different but between what we had and a reformed system of public landlord-private tenant relationships

and between that and private ownership; and, further, that because it would be impossible to persuade the public to divest itself totally of ownership rights in much, even most, of the public grazing lands, the solution for the private grazer users was to recognize and accept their status as tenants on much of the public lands and to work for improved landlord-tenant relations between themselves and the public landlord. Immediately all I had learned in land economics about improved landlord-tenant relations in agriculture came to bear and I began to click-off mentally a multitude of logical and feasible changes that would give tenant graziers security of expectations with compensation for disturbance and improvements and that would protect the public landlord in the conservation of his land holdings.

I regret to say, that nothing came of all this except my own intellectual growth. But even that growth such as it was still left me with my feeling of inadequate conceptual merging of land economics and conventional agricultural economics. I found my land economics useful in conceptualizing the role of the government as landlord and of the rancher as tenant and the nature of the rights, duties, liberties, and exposures that characterized their relationships as well as possible changes in those institutionalized relationships that would presumably improve efficiency and equity for both. But, whereas I was correctly conceptualizing the rancher as a private individualized firm as required by conventional economic theory, I was, for purposes of the same theory, incorrectly conceptualizing the public landlord as if it, too, was a private individual firm. What continued to bother me was what is or

ought to be the structure, role, and behavior of a public landlord in the governing analytical theory? I never figured that one out and, so far as I am yet aware, no one else has either.

I know of only two exceptions to that statement. One is our colleague, a Fellow of this Association, Dr. Marion Clawson, who, in his 1951 book, Uncle Sam's Acres, extensively analyzed the role and conduct of the Federal government as land owner and manager but gave only passing attention to its role as landlord. The other exception was the Public Land Law Review Commission which in its monumental task reported in 1970 gave some attention to the Federal government-private user relation on the Federal lands.

It was at least a dozen years later that I had my next illuminating experience contrasting conventional economics and my land economics.

I was travelling in Australia in the early sixties. I struck up an acquaintance with a senior agricultural economist in the Australian Bureau of Agricultural Economics. We were visiting about a variety of professional matters of mutual interest revolving around policy issues related to land economics. We got into a discussion of agricultural product price supports, particularly the issue of whether or not one should and, if so, how one should incorporate land values into the "base" from which the magnitude of such supports should be calculated. He related his unsuccessful experiences in trying to convince the Ministry, the Parliament, and producer groups that land values should not be included in the base. The gist of his argument was that (1) such a land value is usually taken to be a "fair market value" for

each individual producer's land such as might be generated by a willing seller and a willing buyer negotiating in a land market, these individual parcel market values then being extrapolated to all agricultural lands of similar economic qualities. But (2) such market land values are derived from the "private rents" the parcels generate, capitalized to a private myopic time horizon at private individual discount rates, the land's rent being affected by private individual opportunity costs for the operator's management, labor, and capital and by the prices received for the land's products and prices paid for inputs. However, the level of product prices hence the land's rents will be affected by the very supported prices the level of which the supports are designed to maintain, usually even, to increase. Thus (3) the aggregate value of individually determined land values will be affected by the circularity between the level of supported product prices and the underlying land values, each augmenting the other without any clearly determinable limit. Thus (4) to break that circularity, it is necessary to separate the land value base from individually realizable rents and capitalized values generated in the market place.

But, upon breaking that relationship between supported price, level of rent, and individual land parcel value, what value do we put in its place in the support formula for product prices? Seemingly, such a value would be some aggregate social value of the national aggregate of agricultural lands related to some optimal or improved level of aggregate well-being capitalized to some "long view" time horizon at some "social" discount rate.

But that raises difficult, maybe even impossible, conceptual as well as operational problems.

Just what is the socially relevant level of aggregate agricultural land values? What is the value of a homeland? of the socio-economic base for a society? We didn't know then and I don't know now. But the impact on me was, I think for the first time, clear realization that the "value" of the social aggregate is not simplistically the simple aggregate of individual values -- the aggregate is not, likely, the simple sum of its parts. But what is it?

Not long after, again in Australia, I again ran into the same paradox in a much sharper and more revealing context.

The island of Nauru in the southwest Pacific has been found to be composed of highly rich phosphates. The technical development of fertilization in agriculture led to a fantastic growth in market demand and in price for this natural resource. So, of course, the Nauruans were quick to take advantage of it and entered into contracts with Australian, New Zealand, and other SW Pacific governments to sell their phosphate in the ground at a negotiated rent price which has greatly raised the level of living and welfare of the Nauruans. Until, as you may surmise, they realized that their island homeland would fast become a hole in the sea! What then? Well, of course, they began raising to ever higher and higher levels their asking price (and getting it) per unit of homeland removed. But that hasn't exorcised the devil. For after all, they either must sell their homeland piecemeal, in order to live as they have become accustomed to live, ultimately moving to some other as yet

unacceptable and unlocated alien environment or, by protecting the permanence of their homeland, to live in previous poverty. Is the aggregate value of their homeland the tonnage of phosphate they "own" times its market price per ton? If not, what is its value? Again, the maximization of the market value of their natural resource is not necessarily, is probably much less, than the aggregate social value of the homeland. Here again, the aggregate is clearly not the market sum of its individualized parts. What "support price" for phosphate should the Nauruans adopt? I still don't know the answer. I'm not yet sure I even know how to conceptualize an answer.

Over the years I have enjoyed telling the story of the "Nauruans' Dilemma" to confound my classes but not until I read Kenneth Boulding's 1966 paper, "The Economics of the Coming Spaceship Earth" did I begin that restructuring of my conception of natural resource economics that pointed the direction that resolution of the paradox must take and began that intellectual process that ultimately allayed my intellectual frustrations by finding how to merge the conceptualizations of natural resource economics with the conventional wisdom of economic science. This was the climax point in my intellectual evolution. During the ensuing decade I have been filling in and filling out that conceptual amalgamation.

Just what did Boulding say that brought about in me this intellectual revolution? I quote, "We are now in the middle of a long process of transition in the nature of the image which man has of himself and his environment The image of the frontier is probably

one of the oldest images of mankind, and it is not surprising that we find it hard to get rid of.

"Gradually, however, man has been accustoming himself to the notion of the spherical earth and a closed sphere of human activity Even now we are very far from having made the moral, political, and psychological adjustments which are implied in this transition from the illimitable plane to the closed sphere.

"Economists in particular, for the most part, have failed to come to grips with the ultimate consequences of the transition from the open to the closed earth

"The closed earth of the future requires economic principles which are somewhat different from those of the open earth of the past [The open economy is characterized by] the illimitable plains . . . associated with reckless, exploitative, romantic, and violent behavior The closed economy [on the other hand is one] in which the earth has become a single spaceship, without unlimited reservoirs of anything, either for extraction or for pollution, and in which, therefore, man must find his place in a cyclical ecological system which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy. The difference between the two types of economy becomes most apparent in the attitude towards consumption. In the [open] economy, [of the conventional wisdom, i.e.,] consumption is regarded as a good thing and production likewise; and the success of the economy is measured by the amount of the throughput from the 'factors of production', a part of which, at any rate, is extracted

from the reservoirs of raw materials and noneconomic objects, and another part of which is output into the reservoirs of pollution

"By contrast, in the [closed] economy, throughput is by no means a desideratum, and is indeed to be regarded as something to be minimized rather than maximized. The essential measure of the success of the economy is not production and consumption at all, but the nature, extent, quality, and complexity of the total capital stock, including in this the state of the human bodies and minds included in the system This idea that both production and consumption are bad things rather than good things is very strange to economists, who have been obsessed with the income-flow concepts to the exclusion, almost, of capital-stock concepts

" . . . There are problems here which the economics profession has neglected with astonishing singlemindedness." (Boulding, 1966, pp. 3-14)

Elsewhere, Professor Boulding in 1969 elaborated this theme further, ". . . the real measure of economic welfare is not income at all Income is just the unfortunate price that we have to pay because the state [of the person or of society] is corruptible Consumption is a bad, not a good thing; production is what we must undergo because of consumption

"Much more fundamental is that all of economics, the whole GNP mentality, assumes that economic activity is a throughput, a linear process from the mine to the garbage dump.

"The ultimate physical product of economic life is garbage . . . a great deal of man's activity is directed toward what we might call desired pollution

"If the earth is to become a spaceship, we must develop a cyclical economy within which man can maintain an agreeable state.

"Under such circumstances the idea of the GNP simply falls apart. We need a completely different set of concepts for that eventuality, and we are still a long way from it technologically because we never had to worry about it Suddenly, it is becoming obvious that the Great Plain has come to an end and that we are in a very crowded spaceship. This is a fundamental change in human consciousness, and it will require an adjustment in our ethical, religious, and national systems which may be quite traumatic

"Economic development is the process by which the evil day is brought closer when everything will be gone

"I have recently discovered the real name of the devil, which is something terribly important to know. The real name of the devil is suboptimization, finding out the best way to do something which should not be done at all

"The problem of how to prevent suboptimization is, I think, the great problem of social organization. The only people who have thought about it are the economists, and they have the wrong answer, which was perfect competition. Nobody else has any answer at all. Obviously, the deep, crucial problem of social organization is how to prevent people from doing their best when the best in the particular, in the

small, is not the best in the large." (Boulding, 1970, pp. 157-170).

So, according to Boulding, the conception of earth as spaceship rather than as limitless Plain will require traumatic adjustment in our ethical, religious, and cultural systems -- and, according to me, in our relevant intellectual systems, as well, which includes conventional economic wisdom and will be equally traumatic to us! But paradoxically that conceptual shift set in motion within me the evolution in my intellect that relieved the unconscious traumatic tension I had lived with for decades -- why hadn't it been possible all along to integrate neatly land economics as I knew it with the conventional economic wisdom that I also knew?

Incompatibility Between Natural Resource Economics and Conventional Economic Wisdom

If one defines "land" (in land economics) or "natural resources" (in natural resource economics) as semantically equivalent to the "natural environment" or to "nature" (which I do) and if one conceives nature as a closed system (which it is), then natural resource economics stands conventional economic theory and the conventional real world wisdom of the economy on their respective heads -- upside down which is very upsetting indeed -- and the intellectual trauma migrates out of my mind to enter the minds of those who espouse the conventional economic intellectual wisdom. Why?

Conventional economic intellectuality posits individual economic units as producers and as consumers acting within a system constrained

by conventional economic institutions of which the market, competition, prices, and individualized property are the principal elements. That conventional intellectuality sets as its objective function the maximization of income, of throughput, per capita per unit of opportunity cost. In that conventional intellectual construct, the preference sets of the individualized actors and the environment of institutions that constrain and direct their actions are posited as exogenous constants; the aggregate of incomes which is to be maximized, is taken to be the sum of the optimal individualized net gains generated within the interacting system of individualized actors choosing within the constraining envelope of exogenous preference sets and market institutions.

It is just here that the closed system conception of nature as interpreted and imposed by natural resource economics gets in its upsetting licks -- its upside down trauma on the conventional system.

Maximization of throughput within constant exogenous parameters of preferences and institutions and within an individualized myopic time frame is no longer the relevant desideratum. This is Boulding's sub-optimization devil. In its stead, maintenance or improvement in the state of the capital stock and of the bodies and minds of the aggregate system within a long run (even infinite) time frame wherein there is no "outside", only "inside", is the required desideratum.

Even what we economists have known since Keynes as "macroeconomics" is not truly "macro" as defined by natural resource economics. The Keynesian "macro" is concerned with behavior of aggregate throughput

of the conventional system which is composed of interacting "micro" units guided by the conventional system of relevant preferences and established institutions. It has nothing to say about the physical constraints of a spaceship nature on the macro system nor about the conventional sets of preferences and institutions other than as they are fiscal, financial, and market related.

Defining the problem of economic well-being viewed through the lens of natural resource economics in addition to that of conventional economic wisdom shifts the analytical "line of sight" away from exclusive concern with system throughput to concern for well-being state of the system, away from exclusive attention to preference sets that emphasize satisfactions derived from marketable products to concern for preference sets that emphasize satisfactions derived from inner resources of the person, derived from consumption of marketable products from flow rather than stock resources, and toward satisfactions derived from magnanimous sacrifices made to keep the society's future options open; it also shifts the "line of sight" away from exclusive concern with exogenous conventional institutions of property and away from exclusive concern with structure, conduct, and performance of the competitive market. Natural resource economics also shifts the "line of sight" of economic analysis away from research, education, and the adoption of technology to enhance throughput of marketable products derived from the conversion of resources to garbage and towards research, education, and the adoption of technology to enhance the state of well-being of the system derived from production and consumption based

on flow resources and on the reconversion of garbage into productive inputs, together with minimization of the entropic dissipation of energy.

A big order? It is a terrifyingly big order but one on which nothing less than the permanent viability of mankind as humankind, even possibly as a biotic form, depends absolutely. I am not so brash as to argue that the upside down conversion of conventional economic wisdom that this formulation of the problem implies must be effected today — or even tomorrow! But the time horizon of tomorrows within which the inversion must be effected is frighteningly close! Apocalypse is too close for comfort!

Imposing the structure of ideas that is natural resource economics upon the conventional economic analytical wisdom requires that preference sets and the institutional environment of the conventional wisdom be transposed from exogenous analytical constants to endogenous variables, that problem resolving analyses focus on the means whereby purposeful change can be effected in those preference sets and in that institutional environment, that research, education, and technology increasingly deal with the structure and role of relevant institutions, and with means for their purposeful reformulation that will guide "as by an invisible hand" improvement in the well-being state of the system.

No Need for Natural-Resource Economics in
Conventional Economic Wisdom

I now know that my past intellectual discomfort over the relations between land economics and conventional economics arose because there

is no need or place for natural resource economics as a distinguishable body of ideas within the conventional structure of economic analytical wisdom. In that conventional structure there are only capital and man; there are only production and consumption economics and the market economy; there are only firms, consumers, and financial and fiscal institutions; there are only individualized entities interpersonally related through competition.

Our late colleague, a former President and Fellow of this Association, Professor Karl Brandt, has said, "A further factor that determines the effective capacity of an economy is popularly called natural resources. Their nature, their role in economic growth, and the importance of specific types of resources change with the progress in science and technology and the shifts in domestic and foreign demand. Contrary to popular notions, these resources have no value as such. They represent opportunities to apply management, labor, and capital to them for the purpose of deriving energy or materials from them. Once public or private capital or both have made natural resources accessible or productive, these resources become valuable." (Brandt, p. 33). In that last sentence, Brandt might have said that natural resources so conceived become capital. For, in the analytical construct within which he was reasoning, that of conventional, individualized market-oriented, throughput economics, that is what natural resources are -- capital goods.

Our eminent colleague, Professor Earl Heady, also a Fellow of this Association has said, "Land, as a factor of production, has no

unique characteristics which should cause it to be set aside by itself in economic analysis Land differs from certain other factors in respect to legalistic and institutional characteristics Analysis which relates to institutions per se has come to be known as land economics. Most institutions do, however, have impacts which lend themselves to analysis via economic tools drawn from the basic principles of production, distribution, pricing, and consumption. No new principles unique for land can or need be formulated

"Land perhaps takes on unique importance only in respect to its use and allocation over time" (Heady, p. 763).

Brandt and Heady are both correct in what I have quoted given the conceptual economic analytic framework within which both were working. Both are here concerned with questions of "production, distribution, pricing, and consumption" (to quote Professor Heady) as they emerge in an individualized actor, competitive market system from which maximized throughput efficiency can be analytically deduced. Note that Professor Heady correctly states that "land" as a factor of production has no unique characteristics for analysis, that it differs from other factors in legalistic and institutional ways, and that land economics embraces analyses of "land" which relate to institutions per se. As production economic analysts, he and Brandt were right when one recognizes the implicit framework of conventional "classical" economic maximizing or optimizing of throughput employed by both. But this is Boulding's partial optimization "devil" again if and insofar as it is used to

analyze alternative economic policies as handmaiden to the social process of policy making for natural resources to enhance the state of well-being.

As Heady correctly observes, natural resource economics is uniquely (I would say inherently) institutional. So soon as one incorporates the uniquely institutional natural resource economics together with the uniquely "spaceship" conception of nature into the conventional economic analytical construct, the conventional system experiences a transformation -- it becomes applied institutional economics; it concerns itself with maintenance or improvement of the well-being state of the system rather than with maximization of the throughput of the system, and with minimization of natural resource input in state maintenance or improvement rather than with optimization of natural resource input consonant with efficient throughput maximization -- to paraphrase Boulding, it stands conventional economic wisdom on its head.

To revert to the story of my personal frustrations. The Boulding thoughts I quoted at length gave me the intellectual cue that put me on the path to my tension relaxation. But I do not mean to imply that I did it all on my own following the Boulding cue. For that was but the cue that gave me the conceptual insight that opened my eyes and mind to the significance of the flood of writings by many others over the past two decades -- on externalities and market failure, on Pareto-relevant and Pareto-irrelevant criteria, on property rights and economic behavior, on "collective action in control, liberation, and expansion of individual action" (to quote Commons) relative to the development, depletion, use, and transfers of use of natural resources as they affect the state of

aggregate economic well-being over time.

Policy Analyses, Uncertainty, and Conventional Economic Optimizing

Policy making for natural resources -- or for anything else for that matter -- is indubitably future looking. Hence it is inherently uncertain. Policy making and any economic analysis meant to assist it must recognize this fact of futurity uncertainty. There can be no operational analytical optimum for the long run; there can be only sub-optima for the short run constrained by the promise -- or hope -- that they will improve well-being in the long run. Such inherent futurity uncertainty dictates that greater importance be given even in the short run objective function to reversibility of any policy actions posited than to their optimization. Ability to "back-up" and try something else in the succession of short runs is more important than is a constraining demand for optimizing even in the short run, let alone for the long run.

This demand in policy making and its underlying economic analyses for short run improvement in well-being rather than for optimizing and for reversibility of actions as a constraint on short run policy choices has led Professor Lindblom to conceptualize policy making as marginal incrementalism and to his characterization of the process as "muddling through". (Lindblom 1959a and 1959b). The reversibility constraint upon policy choices is necessary, else over time some

options will be closed, some future alternatives denied, some opportunities for improvement in well-being destroyed forever. Thus, economic analyses useful to policy action must formulate their objective functions in improvement or betterment terms and must build into their analytical models the opportunity costs of any irreversibilities in the array of alternative policy actions explored.

Property in Natural Resources, Monopoly, and Competition

An economic system containing individualized ownerships of natural resource parcels is inherently a monopolistic system; it introduces into conventional individualized economic optimizing implicit monopolistic aberrations in the economic results of the system due to ubiquitous presence of externalities and public good elements, nonreproducibility of stock resources consumed in production, and due to the presence of those unearned, surplus incomes called rents which are not eliminated, may even be accentuated, by competition. Serious questions can and have been raised regarding the private maximization and capture of these natural resource rents which are at bottom monopolistic returns! Individualized property clothes the holders of individualized natural resource parcels with rights and liberties that give them economic power and freedoms of action vis-à-vis others relating to each particular unit of space, the resources it contains, and the products it can be made to generate. Obviously, the degree of monopolistic power with which individual natural resource property holders may be clothed is widely divergent in magnitude and often is very small. But whether such monopolistic power

bestowed on parcel owners is large or small, to that degree it distorts both economic efficiency and equity outcomes from what they would be if the idealized competitive conditions of conventional economic theory were to prevail instead.

But of greater implication for economic policy and more upsetting to purist purveyors of the conventional economic wisdom, the solution for such monopolistic aberrations in aggregate well-being growing out of individualized property in natural resource parcels will not be found in the elimination of those monopolistic elements but rather by their extension to more inclusive collectives. Such extension of monopolization is the real meaning of actions taken to "internalize externalities" and to further the production of "public goods". Maximization of the state of well-being of the society often requires a "monopoly solution" of the natural resource problem. Since monopolization of natural resources by private individuals is politically unthinkable given our present social values, such monopoly solutions require collectivization solutions that range from private collectives such as cooperatives, to quasi-public and truly governmental monopolies. Here, again, the natural resource based problems of aggregate well-being stand the conventional solutions of economic wisdom upside down. Rather than the perfect competition of conventional economic wisdom, natural resource problems often require the opposite -- broadened collectivist, monopolistic solutions!

The intriguing thing about this is that John Stuart Mill and Henry George saw it clearly 100-150 years ago! Why have their insights been so universally ignored -- so single-mindedly ignored by economists (to paraphrase Boulding)?

The answer likely lies in what the historian, Walter Prescott Webb in his book, The Great Frontier, refers to as the 400 year boom in modern history.

"What was the essential character of the frontier? It was inherently a vast body of wealth without proprietors When this great area was made available to the crowded and impoverished people of the Metropolis [by which he means western Europe], they swarmed out like bees to suck up the nectar of wealth, much of which they brought home to the mother hive. This sudden, continuing, and ever-increasing flood of wealth precipitated on the Metropolis a business boom such as the world had never known before and probably can never know again Assuming that the frontier closed in 1890 or 1900, it may be said that the boom lasted about 400 years.

" . . . Assuming that there was a boom, and that it lasted 400 years or more, it follows that a set of institutions, economic, political, and social, would in that time evolve to meet the needs of a world in boom. . . . [T]hese boom-born institutions, economic systems, political systems, social systems - in short, the present superstructure of Western civilization - are today founded on boom conditions.

" . . . scholars will look back on the age when the Golden Door opened, and men marched out to the Great Frontier to create the greatest boom that the world has known; they will make myths and legends about it, and in poetry and literature express their poignant yearning for New Frontiers. They will see the frontier as the great factor in the age called modern, see it clearly as the lost factor which they

would so love to find." (Webb, pp. 13-28, italics in the original).

Conventional economist writers today sound that "poignant yearning" though they express it in economist's rather than historian's language. They call it "economic growth".

Natural Resources and Economic Growth

It is some (but not very much) exaggeration to say that ever since man emerged as a human animal — and particularly during the 400 year boom — economic growth has been the prime solver of his economic welfare problems and has constituted one of the primary foci of public policy and social inventiveness. Economic growth provided the additional real — or throughput — income for additional persons as populations grew, provided the throughput surpluses from which flowed expanded investment in nonhuman and human capital alike, and financed technological change as well as the leisure time for pursuing philosophy, science, and the arts. Economic growth fueled explorations both in the domain of the mind and of the world; it provisioned the efforts by which newly opened vistas of mind and of world were occupied and developed. Economic growth made possible the explorations of mind and world and the exploitation of that which these explorations discovered.

Seldom has the value of economic growth to man and to his quest for a better and happier life been questioned. So basic has it been to man's beliefs that the philosophical systems that underlie his value

systems, the social, economic, and political institutions he has developed and which guide his modes of living all are designed to rationalize, facilitate, and glorify economic growth. It has been the great problem solver and the values and institutions of organized societies have been designed to insure that it will remain so.

Primary among these values and institutions have been democracy, capitalism, and individualism; and the individualized private property in nature, the free markets, and the competition that characterize our conventional economic wisdom. These values and institutions of the 400 year boom were entirely consistant with man's view of the world as if nature's storehouse of productive resources was infinite and the capacity of her dumps and sinks to receive, store, and recycle waste products was also infinite. These values and institutions were wholly consistant with the goal of maximized throughput; economic growth was the perfectly logical desideratum of the good and right.

Small wonder that the penetrating insights of Mill and of George -- insights that saw nature as a limited and closed rather than as a limitless and open system; that saw the shortcomings in individualized property and competition in the resources of nature; that saw the dangers in, even the impossibility of, endless economic growth and the inevitability of lesser, even stationary growth -- small wonder their insights were joyously ignored in the tumultuous excitement of the 400 year boom.

As so well and succinctly put by Barkley and Seckler in their excellent little book, Economic Growth and Environmental Decay - The Solution Becomes the Problem, the conventional solution to the well-being

problem -- economic growth measured in throughput terms -- has itself become the problem demanding solution if we are to realize the well-being maintenance or enhancement goal in the face of natural resource depletion in the spaceship which is nature.

I, too, was an intellectual creature of that boom. But my land economics had generated in me a nagging schizophrenia, a dual personality, together with, if not discord, at least dissonance between those dual sides of my intellect. I well remember the intellectual euphoria I experienced a dozen years ago upon first reading that trenchant work by Barnett and Morse, Scarcity and Growth: The Economics of Natural Resource Availability, from which I superficially gleaned the conclusion that natural resource scarcity need be no restraint on continuing economic growth given all the many ways that our economic system, even in the absence of technological change, can and will mitigate, even eliminate, resource restraints on growth. In defense of Barnett and Morse, I hasten to add that a more careful reading of their work, particularly in the context of a more encompassing natural resource economics on my part that recognized the fundamental, ubiquitous and fixed restraints of space and energy in the spaceship earth, together with a greater awareness of the quality of life parameters in the objective function--how that more careful reading destroyed my euphoria but led me to see that amalgamation of natural resource economics with the conventional economic wisdom upsettingly altered the latter, not the former.

Then in our western society came the upsetting environmental revolution of the "sixties" and the more upsetting energy crisis of the "seventies". Now, not only I and numerous other intellectuals, but increasingly numerous citizens have been jarred out of their complacent euphoria with economic growth and the limitless quantitative expansion of mankind and his consumption. Not only intellectuals but many citizens, too, suddenly confront the closed spaceship reality which is nature and the devastation that that confrontation inflicts on the conventional economic wisdom and its derivatives--democracy, capitalism, and individualism particularly as they relate to individualized property rights in nature and to free markets and competition in natural resources and their primary products.

I do not argue that all economists should be natural resource economists. That would be inexcusably smug egocentrism. I intend no more here than to describe how natural resource economics led me to a clear and critical appraisal of the future usefulness of the conventional economics on which I and all of us have been nurtured. Remember I said this paper is a personal testament.

But I certainly do argue that all of us in our economic analyses, especially where and when they have public policy relevance, must incorporate in our analytical structure the conception of the closed spaceship earth, improvement in the well-being state rather than maximization of the throughput of the system, together with all relevant preference sets and institutional elements as endogenous variables

rather than as exogenous parameters. Doing so, places clear restraints on our conventional economic wisdom as a vehicle for optimizing well-being or improving the state of the dependent society.

Doing so won't be easy, nor always comfortable. I close by quoting the closing paragraphs from Professor John Kenneth Galbraith's book, Economics and the Public Purpose, " . . . the future of economics could be rather bright. It could be in touch with the gravest problems of our time. Whether this is so -- whether economics is important -- is up to the economists. They can, if they are determined, be unimportant; they can if they prefer a comfortable home life and regular hours, continue to make a living out of the infinitely interesting gadgetry of disguise

"Or economists can enlarge their system. They can have it embrace, in all its diverse manifestations, the power they now disguise. In this case, as we have seen, the problems of the world will be part of their system. Their domestic life will be less passive. There may be a contentious reaction from those whose power is now revealed and examined. And similarly from those who have found more comfort than they knew in the fact that economists teach and discuss the wrong problems or none at all. But for a very long time to come economists will thereby escape the fate that Keynes foresaw." (Galbraith, pp. 323-324).

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