

*Natur und Kultur*  
**Uneconomic Growth and Globalization in a Full World**

by  
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*"That which seems to be wealth may in verity be only the gilded index of far-reaching ruin....."*

---John Ruskin, *Unto this Last*, 1862.

Abstract. Uneconomic growth increases environmental and social costs by more than it increases production benefits. It is theoretically possible, yet appears anomalous within the neoclassical paradigm. Why, by contrast, does uneconomic growth appear as an obvious possibility in the alternative paradigm of ecological economics? Although the neoclassical paradigm permits growth forever, it does not mandate it. Historically the mandate came because growth, in an "empty world" was the answer given to the major problems raised by Malthus, Marx, and Keynes. National policies required to deal with these three problems are undercut by "globalization"--the current ideological commitment to global economic integration via free trade and free capital mobility.

Key words: optimal scale, preanalytic vision, globalization vs internationalization, complementarity vs substitutability.

## **I. Uneconomic Growth in Theory**

Growth in GNP is so favored by economists that they call it "economic" growth, thus ruling out by terminological baptism the very possibility of "uneconomic" growth in GNP. But can growth in GNP in fact be uneconomic? Before answering this macroeconomic question let us consider the analogous question in microeconomics--can growth in a microeconomic activity (firm production or household consumption) be uneconomic? Of course it can. Indeed, all of microeconomics is simply a variation on the theme of seeking the optimal scale or extent of each micro activity--the point where increasing marginal cost equals declining marginal benefit, and beyond which further growth in the activity would be uneconomic because it would increase costs more than benefits. Quite aptly, the  $MB = MC$  condition is sometimes called the "when to stop rule".

But when we move to macroeconomics we no longer hear anything about optimal scale, nor about marginal costs and benefits, nor is there anything like a "when to stop rule". Instead of separate accounts of costs and benefits compared at the margin we have just one account, GNP, that conflates cost and benefits into the single category of "economic activity". The faith is that activity overwhelmingly reflects benefits. There is no macroeconomic analog of costs of activity to balance against and hold in check the growth of "activity", identified with benefits, and

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measured by GNP. Unique among economic magnitudes, GNP is supposed to grow forever<sup>2</sup>. But of course there really are costs incurred by GNP growth, even if not usually measured. There are costs of depletion, pollution, disruption of ecological life-support services, sacrifice of leisure time, disutility of some kinds of labor, destruction of community in the interests of capital mobility, takeover of habitat of other species, and running down a critical part of the inheritance of future generations. We not only fail to measure these costs, but frequently we implicitly count them as benefits, as when we include the costs of cleaning up pollution as a part of GNP, and when we fail to deduct for depreciation of renewable natural capital (productive capacity), and liquidation of nonrenewable natural capital (inventories).

There is no *a priori* reason why at the margin the costs of growth in GNP could not be greater than the benefits. In fact economic theory would lead us to expect that to eventually happen. The law of diminishing marginal utility of income tells us that we satisfy our most pressing wants first, and that each additional unit of income is dedicated to the satisfaction of a less pressing want. So the marginal benefit of growth declines. Similarly, the law of increasing marginal costs tells us that we first make use of the most productive and accessible factors of production--the most fertile land, the most concentrated and available mineral deposits, the best workers-- and only use the less productive factors as growth makes it necessary. Consequently, marginal costs increase with growth. When rising marginal costs equal falling marginal benefits then we are at the optimal level of GNP, and further growth would be uneconomic--would increase costs more than it increased benefits.

Why is this simple extension of the basic logic of microeconomics treated as inconceivable in the domain of macroeconomics?<sup>3</sup> Mainly because microeconomics deals with the part, and expansion of a part is limited by the opportunity cost inflicted on the rest of the whole by the growth of the part under study. Macroeconomics deals with the whole, and the growth of the whole does not inflict an opportunity cost, because there is no "rest of the whole" to suffer the cost. Ecological economists have pointed out that the macroeconomy is not the relevant whole, but is itself a subsystem, a part of the ecosystem, the larger economy of nature.

These ideas are represented in Figures I and II. Figure I shows the preanalytic vision of ecological economics--the economy as subsystem of a larger ecosystem that is finite, nongrowing, and materially closed. The ecosystem is open with respect to a flow of solar energy, but that flow is itself finite and nongrowing. There is an "empty-world" and a "full-world" version of this basic vision, reflecting the fact that people who share the same paradigm can have differing senses of urgency based on different interpretations of "the facts". Both will agree, however, that the goal is an optimal scale of the economy relative to the ecosystem. The optimal

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<sup>2</sup> Although macroeconomists see no limits on the size of GNP, they have recognized a limit on its rate of growth in the form of inflation that results as the economy approaches full employment. This is seen more as an institutional bottleneck than a biophysical limit.

<sup>3</sup> Of course if wants and technology change, as surely they do, then the optimal level of GNP will change. But there would then be another optimum beyond which growth would again be uneconomic. It is gratuitous to assume that changes in wants and technology will always be of a kind that results in a larger optimal GNP, or that increases optimal GNP faster than the rate of growth of actual GNP. The growth-forever paradigm has been saved in practice by : increasing focus on insatiable relative wants to the neglect of satiable absolute wants, aggressive advertising, increasing debt, and falling monetary costs of production attained by externalization of the real costs of more powerful and dangerous technologies.

scale is that for which welfare is greatest.

We have two general sources of welfare : services of manmade capital and services of natural capital, as represented by the thick lines in Figure I. As the economy grows natural capital is transformed into manmade capital. More manmade capital results in a greater flow of services from that source. Reduced natural capital results in a smaller flow of services from that source. Moreover, as growth of the economy continues, the services from the economy grow at a decreasing rate. As rational beings we satisfy our most pressing wants first--hence the law of diminishing marginal utility. As the economy encroaches more and more on the ecosystem we must give up some ecosystem services. As rational beings we presumably will sequence our encroachments so that we sacrifice the least important ecosystem services first. This is the best case, the goal. In actuality we fall short of it because we do not understand very well how the ecosystem works, and have only recently begun to think of it as scarce. But the consequence of such rational sequencing is a version of the law of increasing marginal cost--for each further unit of economic expansion we must give up a more important ecosystem service. Costs increase at an increasing rate.

This first step in analysis of the preanalytic vision can be expressed graphically in a diagram (Figure II) whose basic logic goes back to William Stanley Jevons (1871) and his analysis of labor supply in terms of balancing the marginal utility of wages with the marginal disutility of labor. In Figure II the MU curve reflects the diminishing marginal utility of additions to the stock of manmade capital. The MDU curve reflects the increasing marginal cost of growth (sacrificed natural capital services, disutility of labor, disruption of community), as more natural capital is transformed into manmade capital. The optimal scale of the macroeconomy (economic limit to growth) is at point **d**, where  $MU = MDU$ , or where  $ab = bc$ , and net positive utility is a maximum.

Two further limits are noted : point **e** where  $MU = 0$  and further growth is futile even with zero cost ; and point **d**, where an ecological catastrophe is provoked, driving MDU to infinity. These "outer limits" need not occur in the order depicted. The diagram shows that growth out to point **b** is literally economic growth (benefiting us more than it costs), while growth beyond point **b** is literally uneconomic growth (costing us more than it benefits). Beyond point **b** , GNP, "that which seems to be wealth" does indeed become "a gilded index of far-reaching ruin."

The concepts of optimal scale and uneconomic growth have a universal logic--they apply to the macroeconomy just as much as to microeconomic units. How did we come to forget this in macroeconomics? How did we come to ignore the existence of the MDU curve and the issue of optimal scale of the macroeconomy? I will suggest two possibilities : one is the "empty-world vision" that recognizes the logical coherence of the concept of uneconomic growth, but claims that we are not yet at that point--MU is still very large, and MDU is still negligible. Here we can discuss the factual evidence, as will be done in the next section.

The other possibility for explaining the total neglect of the costs of growth is a paradigm difference : the economy is simply not seen as a subsystem of the ecosystem, but rather the reverse--the ecosystem is a subsystem of the economy (Figure III). The ecosystem is merely the extractive and waste disposal sector of the economy. Even if these services become scarce growth can continue forever since technology allows us to "grow around" the ecosystem sector by substitution of manmade for natural capital, following the dictates of market prices--if and when prices of natural capital rise. Nature is really nothing but a supplier of indestructible

building blocks which are substitutable and superabundant. The only limit to growth is technology, and there is, supposedly, no limit to technology, *ergo* no limit to economic growth. Therefore the very notion of "uneconomic growth" makes no sense in that paradigm. Since the economy is the whole, the growth of the economy is not at the expense of anything else--there is no opportunity cost to growth. On the contrary, growth enlarges the total to be shared by the different sectors or subsystems. Growth does not increase the scarcity of anything, rather it diminishes the scarcity of everything! How can one possibly oppose growth?? Growth forever, or a steady state at optimal scale? Each is logical within its own preanalytic vision, and absurd from the viewpoint of the other. We will return in section III to the paradigm issue, but first let us consider some evidence in favor of the full-world version of the preanalytic vision of ecological economics.

## II. Uneconomic Growth in Fact

As noted above one might accept the theoretical possibility of uneconomic growth, but argue that it is irrelevant for practical purposes since, it could be alleged, we are nowhere near the optimal scale. We are thought to be far to the left of point **b** in Figure I--where the benefits of growth are still enormous and the costs still trivial at the margin. Economists all agree that GNP was not designed to be a measure of welfare, but only of activity. Nevertheless they assume that welfare is positively correlated with activity, so that increasing GNP will increase welfare, even if not on a one-for-one basis. This is equivalent to believing that the marginal benefit of GNP growth is greater than the marginal cost. This belief can be put to an empirical test. The results turn out not to support the belief.

Evidence for doubting the positive correlation between GNP and welfare in the United States is taken from from two sources.

First Nordhaus and Tobin<sup>4</sup> asked, "Is Growth Obsolete?" as a measure of welfare, hence as a proper guiding objective of policy. To answer their question they developed a direct index of welfare, called Measured Economic Welfare (MEW) and tested its correlation with GNP over the period 1929-1965. They found that, for the period as a whole, GNP and MEW were indeed positively correlated -- for every six units of increase in GNP there was, on average, a four unit increase in MEW. Economists breathed a sigh of relief, forgot about MEW, and concentrated again on GNP. Although GNP was not designed as a measure of welfare, it was and still is thought to be sufficiently well correlated with welfare to serve as a practical guide for policy.

Some twenty years later John Cobb, Clifford Cobb, and I revisited the issue and began development of our Index of Sustainable Economic Welfare (ISEW) with a review of the Nordhaus and Tobin MEW. We discovered that if one takes only the latter half of their time series (i.e., the eighteen years from 1947-1965) the positive correlation between GNP and MEW falls dramatically. In this most recent period -- surely the more relevant for projections into the future -- a six unit increase in GNP yielded on average only a one unit increase in MEW. This suggests that GNP growth at this stage of United States history may be a quite inefficient way of improving economic welfare --certainly less efficient than in the past.

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<sup>4</sup> Nordhaus, William and James Tobin, 1972, "Is Growth Obsolete?", in Economic Growth, National Bureau of Economic Research, New York, Columbia University Press.

The ISEW<sup>5</sup> was then developed to replace MEW, since the latter omitted any correction for environmental costs, did not correct for distributional changes, and included leisure which both dominated the MEW and introduced many arbitrary valuation decisions. The ISEW, like the MEW, though less so, was positively correlated with GNP up to a point (around 1980) beyond which the correlation turned slightly negative. Neither the MEW nor ISEW considered the effect of individual country GNP growth on the global environment, and consequently on welfare of citizens of other countries. Neither was there any deduction for legal harmful products, such as tobacco or alcohol, nor illegal harmful products such as drugs. No deduction was made for diminishing marginal utility of income resulting from growth over time (although there was a distributional correction for the higher marginal utility of income to the poor). Such considerations would further push the correlation between GNP and welfare toward the negative. Also, GNP, MEW, and ISEW all begin with Personal Consumption. Since all three measures have in common their largest single category, there is a significant autocorrelation bias, which makes the poor correlations between GNP and the two welfare measures all the more impressive.

Measures of welfare are difficult and subject to many arbitrary judgments, so sweeping conclusions should be resisted. However, it seems fair to say that for the United States since 1947, the empirical evidence that GNP growth has increased welfare is weak, and since 1980 probably nonexistent. Consequently, any impact on welfare via policies that increase GNP growth would also be weak or nonexistent. In other words, the “great benefit”, for which we are urged to sacrifice the environment, community standards, and industrial peace, appears, on closer inspection, likely not even to exist.<sup>6</sup>

### **III. Uneconomic Growth in Two Paradigms**

Within the standard neoclassical paradigm uneconomic growth sounds like an oxymoron, or at least an anomalous category. You will not find the concept in any macroeconomics textbook. But within the paradigm of ecological economics it is an obvious possibility. Let us consider why in each case.

A. Neoclassical Paradigm. The paradigm or preanalytic vision of standard neoclassical economics, as noted earlier and depicted in Figure III, is that the economy is the total system, and that nature, to the extent that it is considered at all, is a sector of the economy--e.g. the extractive sector (mines, wells, forests, fisheries, agriculture, including dumps). Nature is not seen as an envelope containing, provisioning, and sustaining the economy, but as one sector of the economy similar to other sectors. If the products or services of the extractive sector should become scarce, the economy will "grow around" that particular scarcity by substituting the products of other sectors. If the substitution is difficult, new technologies, in this view, will be

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<sup>5</sup>For critical discussion and the latest revision of the ISEW, see, Clifford W. Cobb and John B. Cobb, Jr., et al., The Green National Product, University Press of America, New York, 1994. For a presentation of the ISEW see Appendix of For the Common Good, H. Daly and J. Cobb, Boston: Beacon Press, 1989; second edition 1994. See also Clifford W. Cobb, et al., "If the GDP is Up, Why is America Down?," Atlantic Monthly, October, 1995.

<sup>6</sup>For further evidence from other countries, see Manfred Max-Neef, "Economic Growth and Quality of Life: A Threshold Hypothesis", Ecological Economics, 15 (1995)115-118.

invented to make it easy.

The unimportance of nature is evidenced, in this view, by the falling relative prices of extractive products generally, and by the declining share of the extractive sector in total GNP. Beyond the initial provision of indestructible building blocks, nature is simply not important to the economy in the view of neoclassical economics.

That the above is a fair description of the neoclassical paradigm is attested by the elementary "principles of economics" textbooks, all of which present the shared preanalytic vision in their initial pages. This, of course, is the famous circular flow diagram, depicting the economy as a circular flow of exchange value between firms and households--as an isolated system in which nothing enters from outside nor exits to the outside. There is no "outside", no environment. The economic animal has neither mouth nor anus--only a closed-loop circular gut--the biological version of a perpetual motion machine! Further confirmation is found by searching the indexes of macroeconomics textbooks for any entries such as "environment", "nature", "depletion", or "pollution". The absence of such entries is nearly complete. As if to reaffirm the unimportance of nature the advanced textbook chapters on growth theory are based on a neoclassical production function in which production is represented as a function of labor and capital only, with resources totally abstracted from!<sup>7</sup>

A personal experience confirmed to me even more forcefully just how deeply ingrained this preanalytic vision really is. I think it is worth taking the time to recount this experience, which had to do with the evolution of the World Bank's 1992 World Development Report, Development and the Environment.

An early draft of the 1992 WDR had a diagram entitled "The relationship between the economy and the environment". It consisted of a square labeled "economy", with an arrow coming in labeled "inputs" and an arrow going out labeled "outputs"--nothing more. I worked in the Environment Department of the World Bank at that time, and was asked to review and comment on the draft. I suggested that the picture was a good idea, but that it failed to show the environment, and that it would help to have a larger box containing the one depicted, and that the large box (or circle, perhaps) would represent the environment. Then the relation between the environment and the economy would be clear--specifically that the economy is a subsystem of the environment and depends on the environment both as a source of raw material inputs and as a sink for waste outputs. The text accompanying the diagram should explain that the environment physically contains and sustains the economy by regenerating the low-entropy inputs that it requires, and by absorbing the high-entropy wastes that it cannot avoid generating, as well as by supplying other systemic ecological services. Environmentally sustainable development could then be defined as development which does not destroy these natural support functions.

The second draft had the same diagram, but with an unlabeled box drawn around the economy, like a picture frame, with no change in the text. I commented that, while this was a step forward, the larger box really had to be labeled "environment" or else it was merely decorative, and that the text had to explain that the economy was related to the environment in the ways just described.

The third draft omitted the diagram altogether. There was no further effort to draw a

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<sup>7</sup> For more on this ,see "Forum : Georgescu-Roegen versus Solow/Stiglitz", Ecological Economics, 22(1997), September, 1997, pp.261-306.

picture of the relation of the economy and the environment. Why was it so hard to draw such a simple picture?

By coincidence a few months later the Chief Economist of the World Bank, under whom the 1992 WDR was being written, happened to be on a review panel at the Smithsonian Institution discussing the book Beyond the Limits (Donella Meadows, et al.). In that book there was a diagram showing the relation of the economy to the ecosystem as subsystem to total system, identical to what I had suggested (and to Figure I). In the question-and-answer time I asked the Chief Economist if, looking at that diagram, he felt that the issue of the physical size of the economic subsystem relative to the total ecosystem was important, and if he thought economists should be asking the question, "What is the optimal scale of the macro economy relative to the environment that supports it?" His reply was short and definite, "That's not the right way to look at it", he said.

Reflecting on these two experiences has strengthened my belief that the difference truly lies in our "preanalytic vision"--the way we look at it. My preanalytic vision of the economy as subsystem leads immediately to the questions: How big is the subsystem relative to the total system? How big can it be without disrupting the functioning of the total system? How big should it be, what is its optimal scale, beyond which further growth in scale would be uneconomic? The Chief Economist had no intention of being sucked into these subversive questions--that is not the right way to look at it, and any questions arising from that way of looking at it are simply not the right questions.

That attitude sounds rather unreasonable and peremptory, but in a way that had also been my response to the diagram in the first draft of Development and the Environment showing the economy receiving raw material inputs from nowhere and exporting waste outputs to nowhere. "That is not the right way to look at it", I said, and any questions arising from that picture, say, how to make the economy grow faster by speeding up throughput from an infinite source to an infinite sink, were not the right questions. Unless one has in mind the preanalytic vision of the economy as subsystem, the whole idea of sustainable development--of an economic subsystem being sustained by a larger ecosystem whose carrying capacity it must respect-- makes no sense whatsoever. It was not surprising therefore that the WDR'92 was incoherent on the subject of sustainable development, placing it in solitary confinement in a half-page box where it was implicitly defined as nothing other than "good development policy". It is the preanalytic vision of the economy as a box floating in infinite space that allows people to speak of "sustainable growth" (quantitative expansion) as opposed to "sustainable development" (qualitative improvement). The former term is a self-contradictory to those who see the economy as a subsystem of a finite and nongrowing ecosystem. The difference could not be more fundamental, more elementary, or more irreconcilable.

B. Ecological Economics Paradigm. This story of course leads to a consideration of the alternative paradigm, that of ecological economics within which uneconomic growth is an obvious concept. The big difference is to see the economy as a subsystem of the natural ecosystem.

The neoclassical "evidence" for the unimportance of nature (falling relative price of many natural resources, and small share of the extractive sector in GNP) is seen quite differently in the ecological economics paradigm. In an era of rapid extraction of resources their short-run supply will of course be high and their market price consequently will be low. Low resources prices are not evidence of nonscarcity and unimportance, but rather a consequence of rapid drawdown

leading to increasing technological dependence on a large throughput of cheap resources.

As for the neoclassical claim that the small percentage of GNP arising from the extractive sector indicates its unimportance, one might as well claim that a building's foundation is unimportant because it represents only five percent of the height of the skyscraper erected above it. GNP is the sum of value added by labor and capital. But added to what? Resources are that to which value is added--the base or foundation upon which the skyscraper of added value is resting. A foundation's importance does not diminish with the growth of the structure that it supports! Nevertheless, economists habitually argue the contrary. For example, that we need not worry about global warming because the only climate-sensitive sector of the economy is agriculture, and agriculture accounts for only 3% of GNP. These economists evidently don't need to eat--perhaps they come equipped with a closed loop gut similar to what they assume in their circular flow diagram! They also need remedial reflection on the diamonds-water paradox.

If GNP growth resulted only from increments in value added to a nongrowing resource throughput, then it would likely remain economic growth for much longer. Such a process of qualitative improvement without quantitative increase beyond environmental capacity is what I have elsewhere<sup>8</sup> termed "development without growth", and suggested as a definition of "sustainable development". But that is not yet what happens in today's world. According to the World Resources Institute, et al., per capita resource requirement rose, albeit slowly, over the period 1975-93 in Germany, Japan, and The Netherlands. It also rose in the US if one does not count reductions in soil erosion. Population growth in these countries is low, but not zero, giving a further boost to total throughput growth. Since current levels of resource throughput in these countries range from 45 to 85 thousand kilograms per person per year, a level already causing severe environmental degradation, it seems a bit premature to herald the advent of the "dematerialized economy".<sup>9</sup>

Even new knowledge and new technology may work in both ways, enhancing or shrinking carrying capacity. New knowledge may reduce available matter-energy. For example, the greenhouse effect represents new knowledge that lowers the effective availability of fossil fuels because the capacity to absorb the dispersed CO<sub>2</sub> is less than previously thought. New knowledge may reveal new limits. The hole in the ozone layer is new knowledge. To suppose, as is usually done, that new knowledge will always expand the resource base and never contract it is to overspecify the content of new knowledge, which must always be something of a surprise - and not necessarily a pleasant one. Technology may lighten the load of a given scale on environmental carrying capacity and thus in effect expand it, if it allows us to squeeze more welfare from a given flow of resources. But if the new technology is the kind that simply increases the resource flow per person, then it will increase the load on carrying capacity.

What happens, according to ecological economics, is that the economy grows by transforming its environment (natural capital) into itself (manmade capital). The optimal extent of this physical transformation (optimal scale of the economy) occurs, as previously shown, when the marginal cost of natural capital reduction is equal to the marginal benefit of manmade capital

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<sup>8</sup> See H. Daly, Beyond Growth: The Economics of Sustainable Development, Boston, MA: Beacon Press, 1996.

<sup>9</sup> World Resources Institute, et al., Natural Resource Flows: The Material Basis of Industrial Economies, Washington, D.C., April, 1997.

increase. This process of transformation takes place within a total environment that is finite, nongrowing, and materially closed. There is a throughput of solar energy which powers biogeochemical cycles, but that energy throughput is also finite and nongrowing. As the economic subsystem grows it becomes a larger part of the total system, and therefore must conform itself more to the limits of the total system--finitude, nongrowth, and entropy. Its growth is ultimately limited by the size of the total system of which it is a part, even under neoclassical assumptions of easy substitution of manmade for natural capital.

What is not reflected in the market is the value of the optimal sustainable physical scale of the economy relative to the ecosystem. The market does not distinguish an ecologically sustainable scale of matter-energy throughput from an unsustainable scale, just as it does not distinguish between ethically just and unjust distribution of income. Sustainability, like justice, is a value not achievable by purely individualistic market processes. Yet these values can be reflected back into market prices when the market operates under collectively instituted macro constraints designed to protect these values to which the purely individualistic market is blind.

But if manmade and natural capital are complements rather than substitutes, as ecological economics claims, then expansion of the economic subsystem would be much more stringently limited. There would be no point in expanding manmade capital beyond the capacity of remaining natural capital to complement it.

Historically, in the 'empty-world' economy, man made capital was limiting and natural capital superabundant. We have now, due to demographic and economic growth, entered the 'full-world' economy, in which the roles are reversed. The fish catch used to be limited by number of fishing boats (manmade capital) but is now limited by the remaining populations of fish in the sea (natural capital) . What good are more fishing boats when the fish population has become the limiting factor?

When factors are complements the one in short supply is limiting. If factors are substitutes then there cannot be a limiting factor. Economic logic says that we should focus attention on the limiting factor by: (a) maximizing its productivity in the short run; and (b) investing in its increase in the long run . This is a major implication for economic policy--economize on and invest in natural capital. Economic logic stays the same, but the identity of the limiting factor has gradually changed from manmade to natural capital, --e.g. from fishing boats to remaining fish in the sea; from saw mills to remaining forests; from irrigation systems to aquifers or rivers; from oil well drilling rigs to pools of petroleum in the ground; from engines that burn fossil fuel to the atmosphere's capacity to absorb CO<sub>2</sub>, etc.

Viewed from the perspective of ecological economics even the usual neoclassical assumption of easy substitution of manmade for natural capital (and consequent neglect of limiting factor phenomena) provides no argument for continual growth, even though it relaxes the tightest constraint on present growth. If manmade capital substitutes for natural capital, then natural capital substitutes for manmade capital. Substitution is reversible. If our original endowment of natural capital was a good substitute for manmade capital, then why, historically, did we go to the trouble of transforming so much natural capital into manmade capital? The issue is not substitution between two types of natural resource (like substitution between exhaustible resources and renewable resources); rather it is one of substitution of capital for

resources, an entirely different matter. Easy substitution between two types of natural resource will not help the world to get along without natural resources!

Since the neoclassical production function is often explained as a technical recipe, we might say that such a recipe calls for making a cake with only the cook and his kitchen. We do not need flour, eggs, sugar, and so on, nor electricity or natural gas, nor even firewood. If we want a bigger cake, the cook simply stirs faster in a bigger bowl and cooks the empty bowl in a bigger oven that somehow heats itself. Nor does the cook have any cleaning up to do, because the production recipe produces no wastes. There are no rinds, peelings, husks, shells or residues, nor is there any waste from heat from the oven to be vented. Furthermore, we can make not only a cake, but any kind of dish - a gumbo, fried chicken, a paella, bananas foster, cherries jubilee - all without worrying about the qualitatively different ingredients, or even about the quantity of an ingredient at all! Real recipes in real cookbooks, by contrast, *begin* with a list of specific ingredients and amounts.

Neoclassical believers in easy substitution have no good answer. Nor do they have a very good answer to the question: How can you make more capital without using more resources? The problem does not arise for ecological economists because they affirm from the beginning that natural and manmade capital are basically complements and only marginally substitutes.

The optimal scale of the economy is smaller, the greater is: (a) the degree of complementarity between natural and manmade capital; (b) our desire for direct experience of nature; and (c) our estimate of both the intrinsic and instrumental value of other species. The smaller the optimal scale of the economy, the sooner its physical growth becomes uneconomic.

#### **IV. From Permitting Growth, to Mandating Growth, to Limiting Growth**

The neoclassical paradigm permits growth forever but does not really mandate it. Historically, what pushed the growth-forever ideology was not neoclassical logic, but rather the practical answer given to the problems addressed by Malthus (overpopulation), Marx (unjust distribution), and Keynes (involuntary unemployment). Growth was the common answer to all three problems.

Overpopulation would be cured by the demographic transition. When GNP per capita reaches a certain level children become too expensive in terms of other goods forgone and the birth rate automatically falls. Economic growth is the best contraceptive, as the slogan goes. Whether the product of increased per capita consumption times the decreased birth rate of "capitas" results in increasing total consumption beyond optimal scale remains an unasked question. More concretely, is it necessary for Indian per capita consumption to rise to the Swedish level for Indian fertility to fall to the Swedish level, and if so what happens to the Indian ecosystem as a result of that level of total consumption?

Unjust distribution of wealth between classes would be rendered tolerable by growth, the rising tide that lifts all boats, to recall another slogan. Yet growth has in fact increased inequality both within and among nations. To make matters worse, even the metaphor is wrong, since a rising tide in one part of the world implies an ebbing tide somewhere else.

Unemployment would yield to increasing aggregate demand which merely required that

investment be stimulated, which of course implies growth. How long can we continue to avoid unemployment by growth? Must we grow beyond optimal scale in pursuit of full employment? Another unasked question.

Continuing this time-honored tradition the World Bank's 1992 WDR argued that more growth was also the automatic solution to the environmental problem. A so-called "environmental Kuznets curve" was discovered, which was taken to reveal an inverted U shaped relation between GNP and a number of environmental pollutants. Consequently, one must persevere in growth because even though it initially is bad for the environment, it will later be good for the environment once we pass the hump of the inverted U.

But of course the assumption in all cases is that growth is economic, that it is making us richer rather than poorer. But now growth is becoming uneconomic. Uneconomic growth will not sustain the demographic transition and cure overpopulation. Neither will it help redress unjust distribution, nor cure unemployment. Nor will it provide extra wealth to be devoted to environmental repair and clean-up. Indirect growth-based solutions to the big problems no longer work.

We now need more direct and radical solutions to the problems of Malthus, Marx, and Keynes : population control to deal with overpopulation; redistribution to deal with excessive inequality; and measures such as a WPA-like public employer of last resort, and ecological tax reform to raise resource prices relative to labor. These must be national policies. It is utopian (or dystopian) to think of them being carried out by a world authority. Many nations have made progress in controlling their population growth, in limiting domestic income inequality, in reducing unemployment. They have also improved resource productivity by internalizing environmental and social costs into prices. But nations' efforts in this regard are undercut by the ideology of globalization--a last gasp attempt to reestablish the conditions of the empty-world economy by growing into the economic and ecological space of other countries, and into the remaining global commons.

## **V. Globalization as Stimulus to Uneconomic Growth**

The newspapers and TV say that if you oppose globalization you must be an "isolationist" or even worse a "xenophobe". Nonsense. The relevant alternative to globalization is internationalization, which is neither isolationist nor xenophobic. The media don't know the difference, so let us define the terms clearly:

Internationalization refers to the increasing importance of relations between nations: international trade, international treaties, alliances, protocols, etc. The basic unit of community and policy remains the nation, even as relations among nations, and among individuals in different nations, become increasingly necessary and important.

Globalization refers to global economic integration of many formerly national economies into one global economy, by free trade, especially by free capital mobility, and also, as a distant but increasingly important third, by easy or uncontrolled migration. Globalization is the effective erasure of national boundaries for economic purposes. National boundaries become totally porous with respect to goods and capital, and increasingly porous with respect to people, viewed in this context as cheap labor, or in some cases cheap human capital.

In sum, globalization is the economic integration of the globe. But exactly what is "integration"? The word derives from "integer", meaning one, complete, or whole. Integration

means much more than “interdependence”--it is the act of combining separate albeit related units into a single whole. Since there can be only one whole, only one unity with reference to which parts are integrated, it follows that global economic integration logically implies national economic disintegration -- parts are torn out of their national context (dis-integrated), in order to be re-integrated into the new whole, the globalized economy. As the saying goes, to make an omelette you have to break some eggs. The disintegration of the national egg is necessary to integrate the global omelette. This obvious logic, as well as the cost of disintegration, is frequently met with denial.

Denial aside, all that I have just said was expressed with admirable clarity, honesty, and brevity by Renato Ruggiero, former director-general of WTO: “*We are no longer writing the rules of interaction among separate national economies. We are writing the constitution of a single global economy.*” This is a clear affirmation of globalization and rejection of internationalization as just defined. It is also a radical subversion of the Bretton Woods Charter. Internationalization is what the Bretton Woods Institutions were designed for, not globalization.

Does economic integration imply or entail political and cultural integration? I suspect it does over the long run, but I honestly do not know which would be worse--an economically integrated world with, or without, political integration. Everyone recognizes the desirability of community for the world as a whole-- but we have two very different models of world community: (1) a federated community of real national communities (internationalization), versus (2) a cosmopolitan direct membership in a single abstract global community (globalization).

If the IMF-WB-WTO are no longer serving the interests of their member nations as per their charter, then whose interests are they serving? The interests of the integrated “global economy” we are told. But what concrete reality lies behind that grand abstraction? Not real individual workers, peasants, or small businessmen, but rather giant fictitious individuals, the transnational corporations.

Consider a few consequences of globalization, of the erasure of national boundaries for economic purposes.

**1.** Globalization undercuts the ability of nations to internalize environmental and social costs into prices. Economic integration under free market conditions promotes standards-lowering competition (a race to the bottom). The country that does the poorest job of internalizing all social and environmental costs of production into its prices gets a competitive advantage in international trade. More of world production shifts to countries that do the poorest job of counting costs-- a sure recipe for reducing the efficiency of global production. As uncounted, externalized costs increase, the positive correlation between GDP growth and welfare disappears, or even becomes negative, leading to uneconomic growth.

Another dimension of the race to the bottom is the increasing inequality in the distribution of income in high-wage countries, such as the US, fostered by globalization. In the US there has been an implicit social contract established to ameliorate industrial strife between labor and capital. Specifically, a just distribution of income between labor and capital has been taken to be one that is more equal within the US than it is for the world as a whole. Global integration of markets necessarily abrogates that social contract. US wages will fall drastically because labor is relatively much more abundant globally than nationally. It also means that returns to capital in the US will increase because capital is relatively more scarce globally than

nationally. Theoretically, one might argue that wages would be bid up in the rest of the world. But the relative numbers make this a bit like saying that, theoretically, when I jump off a ladder gravity not only pulls me to the earth, but also moves the earth towards me.

Free trade, and by extension globalization, is often defended by appeal to comparative advantage. The logic of comparative advantage assumes that factors of production, especially capital, are immobile between nations. Only products are traded. With capital mobility now the major defining feature of globalization we have left the world of comparative advantage and entered a regime of absolute advantage which guarantees gains from trade to the world as a whole, but does not guarantee that each nation will share in those gains, as was the case under comparative advantage. Global gains under absolute advantage are theoretically greater than under comparative advantage, but there is no reason to expect these gains to be shared by all trading partners. Mutual gain could be restored under absolute advantage by redistributing some of the global gains from trade. But I have never heard that idea discussed by globalization advocates. Often they appeal, quite illogically, to the doctrine of comparative advantage as a guarantee of mutual benefit, conveniently forgetting that the logic of comparative advantage requires immobile capital, and that capital is not immobile. Indeed, some even argue for free capital mobility by extension of the comparative advantage argument-- if free trade in goods is mutually beneficial then why not also have free trade in capital? However, one cannot use the conclusion of an argument to abolish one of the premises upon which the argument is based!

Nowhere is there any recognition that although trade will allow some countries to live beyond the ecological carrying capacity of their borders, all countries cannot possibly do this - no matter how much world trade may expand, all countries cannot be net importers of raw materials and natural services. Thus the experience of The Netherlands or Hong Kong cannot be generalized. Free trade allows the ecological burden to be spread more evenly across the globe, thereby buying time before facing up to limits, but at the cost of eventually having to face the problem simultaneously and globally rather than sequentially and nationally.

2. Fostering global competitive advantage is used as an excuse for tolerance of corporate mergers and monopoly in national markets (we now depend on international trade as a substitute for domestic trust busting to maintain competition). It is ironic that this is done in name of deregulation and the free market. Chicago School economist and Nobel laureate Ronald Coase in his classic article on the Theory of the Firm, said “ --*Firms are islands of central planning in a sea of market relationships*”. The islands of central planning become larger and larger relative to the remaining sea of market relationships as a result of merger. More and more resources are allocated by within-firm central planning, and less by between-firm market relationships. And this is hailed as a victory for markets! It is no such thing. It is a victory for corporations relative to national governments which are no longer strong enough to regulate corporate capital and maintain competitive markets in the public interest. Of the 100 largest economic organizations 52 are corporations and 48 are nations. One-third of the commerce that crosses national boundaries does not cross a corporate boundary, i.e. is an intra-firm non market transfer. The distribution of income within these centrally planned corporations has become much more concentrated. The ratio of salary of the Chief Executive Officer to the

average employee has passed 400 on its way to infinity--what else can we expect when the chief central planners set their own salaries!

3. Free trade and free capital mobility increase pressures for specialization according to competitive (absolute) advantage. Therefore the range of choice of ways to earn a livelihood become greatly narrowed. In Uruguay, for example, everyone would have to be either a shepherd or a cowboy in conformity with the dictates of competitive advantage in the global market. Everything else should be imported in exchange for beef, mutton, wool, and leather. Any Uruguayan who wants to play in a symphony orchestra or be an airline pilot should emigrate.

Most people derive as much satisfaction from how they earn their income as from how they spend it. Narrowing that range of choice is a welfare loss uncounted by trade theorists. Globalization assumes either that emigration and immigration are costless, or that narrowing the range of occupational choice within a nation is costless. Both assumptions are false.

While the range of choice in earning one's income is ignored by trade theorists, the range of choice in spending one's income receives exaggerated emphasis. For example, the US imports Danish butter cookies and Denmark imports US butter cookies. The cookies cross each other somewhere over the North Atlantic. Although the gains from trading such similar commodities cannot be great, trade theorists insist that the welfare of cookie connoisseurs is increased by expanding the range of consumer choice to the limit.

Perhaps, but could not those gains be had more cheaply by simply trading recipes? One might think so, but recipes (trade related intellectual property rights) are the one thing that free traders really want to protect.

4. Of all things knowledge is that which should be most freely shared, because in sharing it is multiplied rather than divided. Yet, our trade theorists have rejected Thomas Jefferson's dictum that "*Knowledge is the common property of mankind*" in exchange for a muddled doctrine of "trade related intellectual property rights" by which they are willing to grant private corporations monopoly ownership of the very basis of life itself--patents to seeds (including the patent-protecting, life-denying terminator gene) and to knowledge of basic genetic structures.

The argument offered to support this grab is that, unless we provide the economic incentive of monopoly ownership for a significant period of time, little new knowledge and innovation will be forthcoming. Yet, as far as I know, James Watson and Francis Crick, who discovered the structure of DNA, do not share in the patent royalties reaped by the second rate gene-jockeys who are profiting from their monumental discovery. Nor of course did Gregor Mendel get any royalties--but then he was a monk motivated by mere curiosity about how Creation works!

Once knowledge exists, its proper allocative price is the marginal opportunity cost of sharing it, which is close to zero, since nothing is lost by sharing it. Yes, of course you do lose the monopoly on the knowledge, but then economists have traditionally argued that monopoly is inefficient as well as unjust because it creates an artificial scarcity of the monopolized item.

Of course the cost of production of new knowledge is not zero, even though the cost of sharing it is. This allows biotech corporations claim that they deserve a fifteen or twenty year monopoly for the expenses they incur in research and development. Of course they deserve a profit on their efforts, but not on Watson and Crick's contribution without which they could do nothing, nor on the contributions of Gregor Mendel, and all the great scientists of the past who made the fundamental discoveries. As economist Joseph Schumpeter emphasized, being the first

with an innovation already gives one a temporary monopoly. In his view these recurring temporary monopolies were the source of profit in a competitive economy whose theoretical tendency is to compete monopoly profits down to zero. This is the very essence of efficiency in a competitive economy. Why obstruct it with artificial knowledge monopolies?

Believe it or not, most important discoveries were made without the benefit of granting monopoly ownership of the knowledge to the discoverer. Can you imagine such a thing--scientists motivated by the pure love and excitement of discovery, and content with a university salary that puts them only in the top ten percent, but not the top one percent, of income recipients!!

As the great Swiss economist, Sismondi, argued long ago, not all new knowledge is a benefit to mankind. We need a social and ethical filter to select out the beneficial knowledge. Motivating the search for knowledge by the purpose of benefiting mankind rather than by securing monopoly profit, provides a better filter.

This is not to say that we should abolish all intellectual property rights--that would create more problems than it would solve. But we should certainly begin restricting the domain and length of patent monopolies rather than increasing them so rapidly and recklessly. And we should become much more willing to share knowledge. Shared knowledge increases the productivity of all labor, capital, and resources. International development aid should consist far more of freely shared knowledge, and far less of foreign investment and interest-bearing loans.

Let me close with my favorite quote from John Maynard Keynes, one of the founders of the recently subverted Bretton Woods Institutions:

*" I sympathize therefore, with those who would minimize, rather than those who would maximize, economic entanglement between nations. Ideas, knowledge, art, hospitality, travel--these are the things which should of their nature be international. But let goods be homespun whenever it is reasonably and conveniently possible; and, above all, let finance be primarily national."*

## A "Macro" View of the Macroeconomy

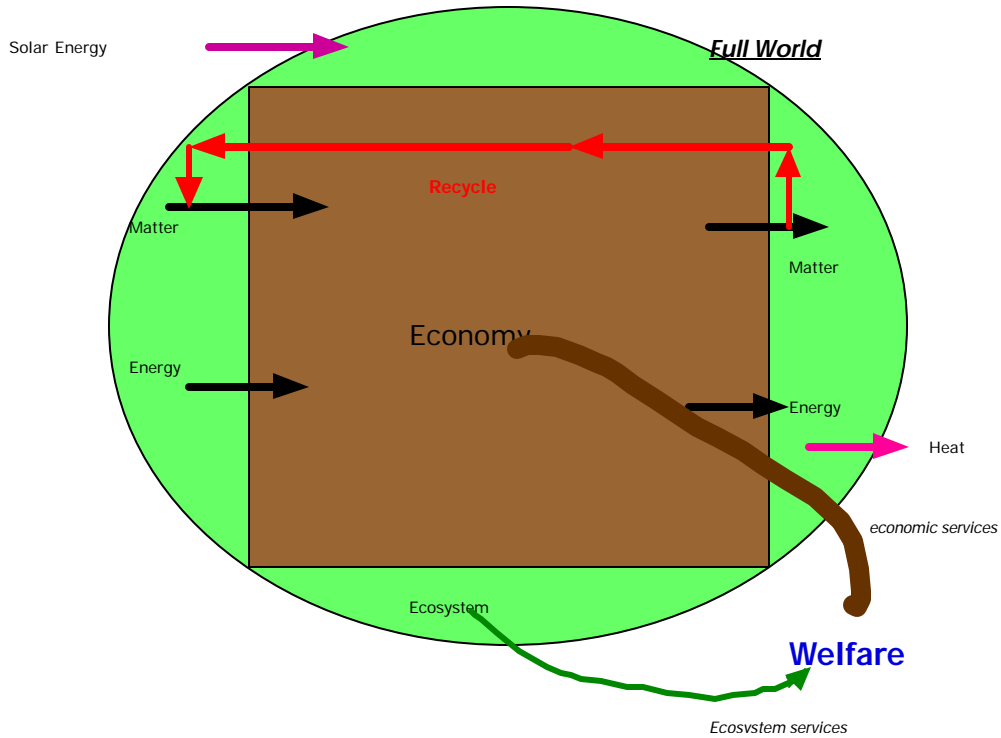
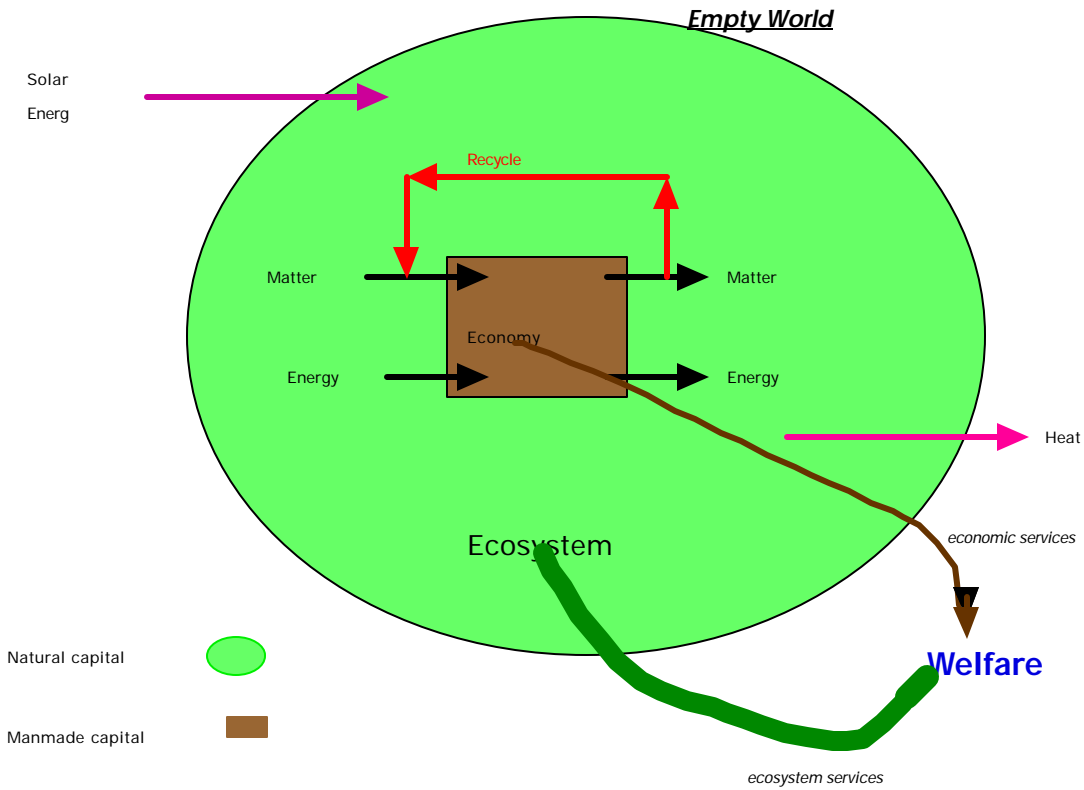
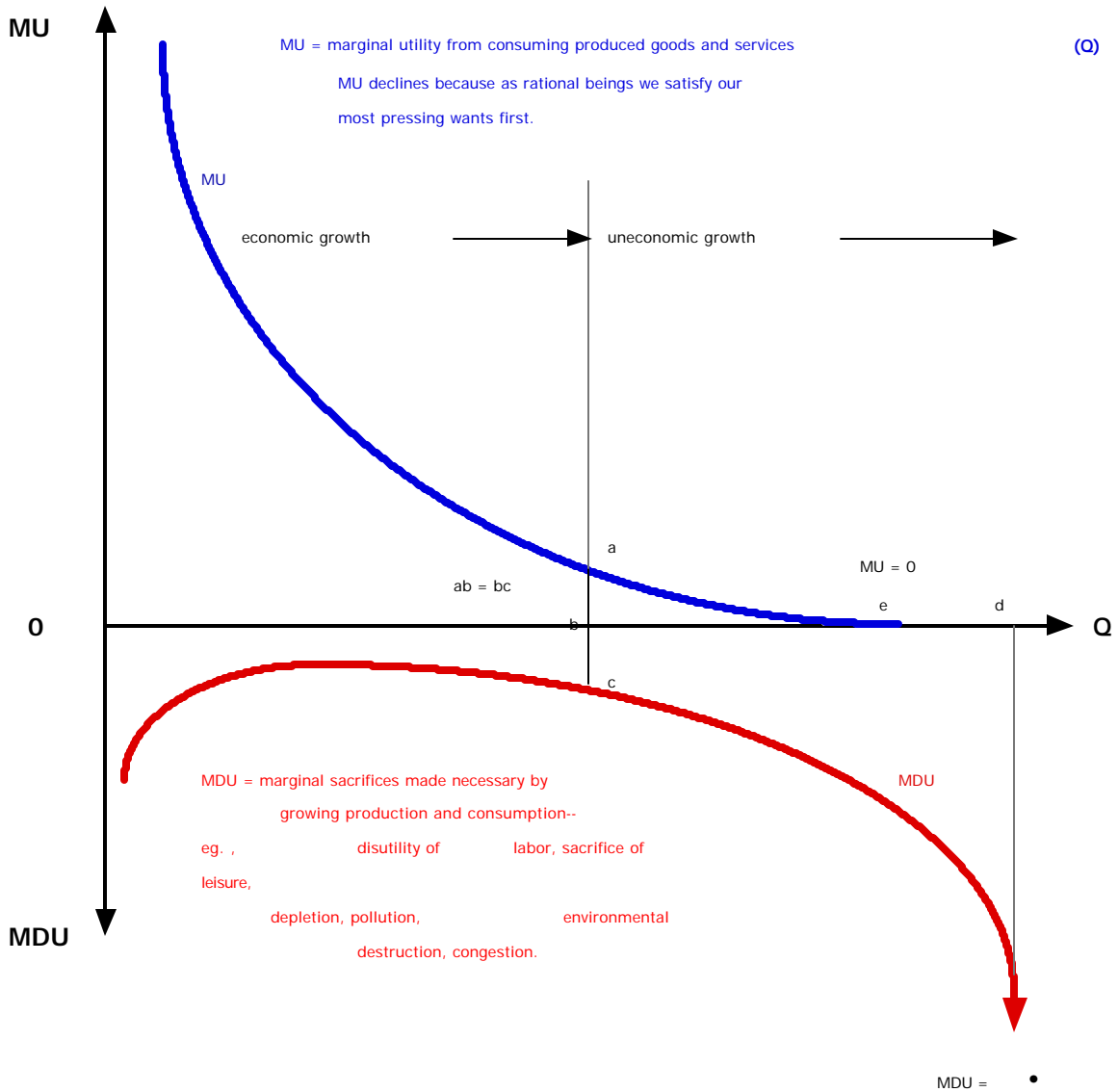


Figure II

**Jevonian View of Limits to Growth of Macroeconomy**



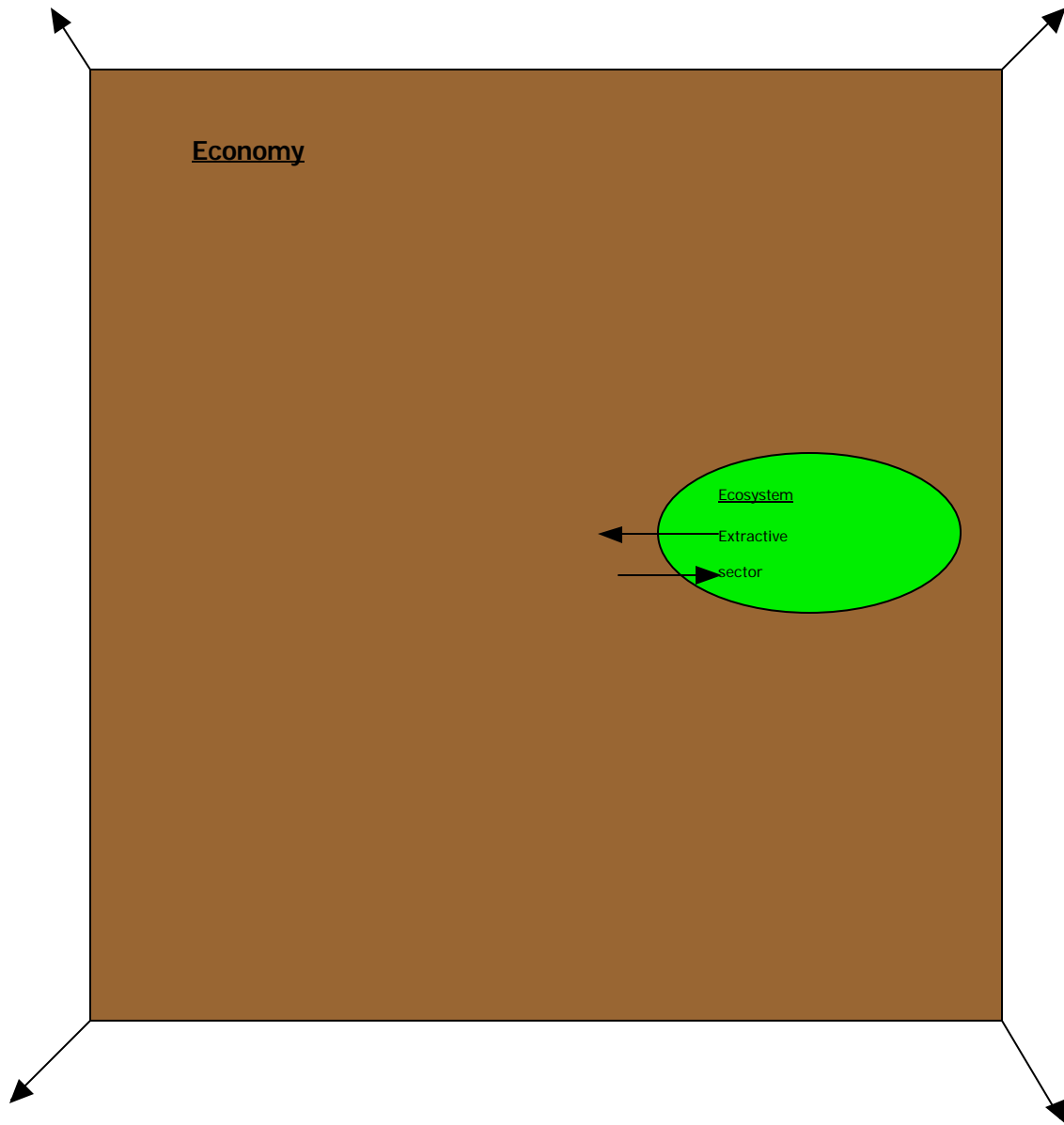
Limits to Growth of Macroeconomy

b = economic limit ; MU = MDU ; (maximum net positive utility)

e = futility limit ; MU = 0 ; (consumer satiation)

Figure III

Ecosystem as Subsystem of Macroeconomy



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