Full Employment and Environmental Sustainability

by
Mathew Forstater

Working Paper No. 13

June 2001

*Director, Center for Full Employment and Price Stability, University of Missouri-Kansas City

This paper suggests that a Public Service Employment (PSE) or Job Guarantee (JG) program run on the principles of functional finance can be designed to promote environmental sustainability. Unregulated or poorly regulated capitalist economies are both macroeconomically unsatisfactory (here focusing on unemployment, but including also price stability) and environmentally unsustainable. Traditional approaches addressing either unemployment or environmental degradation are insufficient to achieve full employment or environmental sustainability, and often proposals to attain one of these goals appear inconsistent with the other. A PSE program based on functional finance can achieve full employment, and may also present opportunities to promote environmental sustainability. A functional finance approach to ecological tax reform presents an opportunity to promote both macroeconomic and environmental goals. The flexibility of a PSE system also can be utilized to promote sustainability in a number of ways. PSE workers may also perform an array of environmental services, including monitoring, clean up, recycling, education, and more.

I. Unregulated or badly regulated capitalism is both macroeconomically unsatisfactory (unemployment) and environmentally unsustainable.

History has shown us that unemployment and environmental degradation are normal features of capitalist economies. Involuntary unemployment can result from deficiencies in aggregate demand as well as structural and technological change. Keynes (1936) demonstrated that capitalism, as a monetary production economy, is inherently demand constrained. In particular, the private sector's desire to net save, or hold net financial assets, will show up as unemployment unless this desire is satisfied by government policy (Mosler, 1997-98; Wray, 1998):

> Unemployment is the real, material evidence of a discrepancy between desired and actual levels of net nominal savings, for if the desired level was lower, individuals would be spending more, sales would be higher, and firms would be hiring more workers… [T]here is only one solution to closing the gap between desired and actual levels of net nominal savings: government deficits… There is no other source of change in the private sector's total holdings of net financial assets [denominated in the domestic currency]… The private sector is incapable of creating net nominal assets. (Forstater, 2000b, p. 8)

The inherently demand-constrained nature of capitalist economies resulting in involuntary unemployment may be referred to as the *effective demand problem*.

Capitalist economies are also incapable of *maintaining* full employment, even if it could be *attained*, in the face of ongoing structural and technological change. Even if the effective demand problem could be rectified by government policy, changes in labor supply, capital- and labor-displacing technological change, and changes in the composition of final demand impose intersectoral shifts in labor requirements unlikely to be satisfied by market forces without generating unemployment (Lowe, 1976; Pasinetti, 1981, 1993). The structural rigidities associated with high employment, high capacity capitalist systems may be referred to as the *structural change problem*.

The effective demand problem and the structural change problem present contemporary capitalist economies with the challenge of attaining and maintaining full employment. In addition, there are other related issues, such as price and currency stability. Some policy or set of policies must be developed and implemented that can address these problems.

Environmental degradation in the form of unsustainable rates of natural resource depletion and excessive pollution of land, air, and water is characteristic of modern capitalist economies. Humanity now faces significant challenges in the form of both local ecological crises and global environmental problems, such as ozone depletion, global climate change, biodiversity loss, soil erosion and deforestation (see Wackernagel and Rees, 1995; Brown, Renner, and Halweil, 1999, for overviews and summaries).

In a capitalist economy, competitive pressures greatly restrict the discretion firms have with regard to the inputs they use, the products they make, and the methods of production they utilize. They must make such decisions on the basis of their estimate of the profitability of alternative actions, and profitability requires the minimization of a firm's costs. A firm has no direct market incentive to concern itself with costs that are a burden on third parties or society at large, including those that harm the environment.

For example, a firm may choose a particular method of production that creates pollution on the basis of its efficiency, even though it imposes social costs. "Efficiency" here means private cost minimization, and not only does it not guarantee a more broadly defined "social efficiency," it may reduce social efficiency. In addition, as will be seen below, it is not only the effects of individual firm behaviors in isolation, but also the cumulative, concentrated, and combined effects of many firms—often greater than the sum of their parts—that are of concern. Households, too, may make decisions concerning consumption patterns, lifestyles, and household organization that have wider social and environmental implications. Here again, the aggregate effects may be subject to cumulative forces. The social and environmental costs of market society may be further exacerbated by the wrong kinds of subsidies and other government policies that encourage unsustainable behaviors (see Roodman, 1996). Unregulated or poorly regulated capitalism is not environmentally sustainable.

To understand the environmental and ecological challenges that face humanity, and the economic implications of an adequate response to these challenges, it is necessary to reconceptualize the relation between the economy and the environment. Economics has long overlooked or inadequately treated the relation between the economy and the environment. If we consider this relationship, even at a very basic level, we can derive what might be called some *biophysical conditions for a sustainable economy.* Similar conditions can be found in the literature on "sustainable development" and "ecological economics" (see, e.g., Lawn, 2001; Holmberg, et al., 1996; Callenbach, 1999; Prugh, et al., 2000).

The environment provides natural resources to the economy to be used as inputs in production processes (the "source function" of the environment). The output of these production processes may be either produced inputs for yet other production processes or final products to be directly consumed. Yet these produced inputs and final products are not the entirety of the output; there are also residual by-products of these processes (waste).

Just as the economy extracts natural resources from the environment, the economy in turn dumps many residual by-products, or waste, back into the environment (the "sink function" of the environment). There is waste at each stage of the economic process: waste from extracting and refining natural resources, waste emanating from production processes, waste in the marketing of products, and waste in the sphere of consumption.

There is an interesting relationship between the total natural resources utilized and the total waste produced by the economy. That is, they are ultimately equivalent. This is due to the First Law of Thermodynamics, which states that matter-energy can neither be created nor destroyed; only the form of matter-energy can change (Georgescu-Roegen, 1971). Of course, it is more complicated than a simple equality. Natural resources are frozen in the form of capital goods during the depreciation process (and capital goods from previous periods are at differing stages in the depreciation process), and there is a time element in the consumption of many final products as well. At a fundamental level, however, the equality holds.

Waste can be divided into two types: that waste which is recyclable or reusable and that which is not. The fact that all waste is not recyclable or reusable is due to the Second Law of Thermodynamics, which states that any utilization of matter-energy decreases the total available matter-energy. In other words, some of the forms into which matter-energy is transformed can no longer be accessed. This is also known as the Entropy Law, and put differently means that not all the forms into which matter and energy are transformed are recyclable or reusable. That waste which is not recycled or reused is dumped into the environment.

The environment has an assimilative capacity, which is the ability of the environment to transform waste into harmless (or even beneficial) forms. This assimilative capacity, however, is not infinite. Waste at some level is not only incapable of being assimilated, but will damage or even destroy the assimilative capacity itself.

It is not simply the level of *homogeneous* waste in relation to the assimilative capacity that needs to be considered, but additionally what specific *types* of waste are being emitted. Some types of waste are not assimilable in any quantity, and at some stock level can result in various detrimental effects, including damage to the assimilative capacity itself. In addition, it must be recognized that it is not sufficient to simply look at each type of waste and the quantity of it emitted in isolation, but also synergistic effects.

The *combinations* of different forms of waste have effects that are more damaging than the sum of the component waste products independently of one another. A classic case here is sulfur dioxide and nitric oxide resulting in acid precipitation (acid rain, fog, and snow). So it is not just quantities and qualities of waste, but also their combination effects.

It also must be recognized that it is not simply qualities and quantities of waste globally, but also spatial considerations concerning the local *concentration* of wastes that are crucial. And it is not simply the case that the assimilative capacity detoxifies or degrades waste instantaneously, or even within some set time period. There are *cumulation* effects that have to be dealt with. So in assessing the ability of the assimilative capacity to deal with industrial and other waste, combination effects, concentration effects, and cumulation effects all need to be carefully considered.

Furthermore, there is nothing that guarantees that all waste that is *capable* of being recycled or reused *is* being recycled or reused. All waste, whether recyclable or not, which is dumped into the environment, may impact on the assimilative capacity. Therefore, when considering the quantities and qualities of wastes confronting the assimilative capacity, only those residuals may be exempted which are *actually* recycled.

The portion of waste that is actually recycled or reused has a positive impact on our stock of natural resources, in the sense that recycling and reuse decreases the amount of new resources we must utilize. We cannot, however, account for the positive feedback of recycled materials on natural resource stocks until we account for the fact that recycling is also an entropic process. It takes energy and matter to recycle waste, so waste is emitted in the process of recycling. Even though it is necessary to recycle, we have to account for the loss of available matter and energy resulting from recycling itself. So if we want to indicate the positive feedback of recycling on the stock of natural resources, we have to also include the waste produced by recycling.

Natural resources can also be divided into two types: those that are renewable only within a geological time frame and therefore for human purposes must be considered exhaustible or nonrenewable resources, and those that are renewable within a human time frame. In the case of exhaustible resources, since the total stock is fixed, the yield or rate of renewal is equal to zero. Therefore any utilization of these resources reduces the amount which we have at our disposal for future use. Thus, if the rate of utilization exceeds the rate of renewal (i.e., is positive), the total stock of exhaustible resources is decreasing and may decrease to zero.

In the case of renewables, which have a positive yield or rate of renewal, there are two alternative scenarios. If the rate of utilization is less than or equal to the rate of renewal, then the total amount of these resources may be maintained or even increase. But if rate of utilization exceeds the yield, then the total amount that we have at our disposal will be decreasing and may decrease to zero.

It's actually a little more complicated than this, because there is a distinction between stock renewables, such as trees, and flow renewables, such as solar, wind, or hydro, sometimes called perpetual resources. As a source, flow renewables are limited by the rate of the flow and our technological ability to capture the flow for human use. In the case of stock renewables the yield is not constant and may even become negative. This is because, for stock renewables, the yield is related to the stock level.

Above some critical stock level, the carrying capacity of the habitat will be reached and the yield will turn negative. Also, if the level of stock renewables falls below some critical point, the renewability of the resource can be damaged and the yield will become negative. But at stock levels between the minimum and maximum level, the yield will be positive, though not constant. Since the yield is not constant, there is some stock level associated with what is called the maximum sustainable yield.

Obviously, at this stock level the rate of utilization can be maximized without reducing the amount of this resource available for future use. This result, however, requires a *ceteris paribus* assumption regarding all other relevant factors in the ecosystem. In other words, it disregards the very important problem of *interacting* resources (see Semmler and Sieveking, 1992).

Of course, human populations also may overrun the carrying capacity of the environment, locally or globally. This is a complex question and entails looking carefully at the issues, including basic human needs and technology. Human beings also have a limited physical capacity to absorb toxins. Thus, the question of population, as well as human health, must be factored in.

There are also relations between the assimilative capacity and renewable resources that must be taken into consideration. For example if the rate of utilization of renewable resources is greater than their yield, not only will the total amount available for future use be declining, and potentially to zero, but this can have secondary effects on the assimilative capacity of the environment. The rainforests serve as a good example here. If we utilize the trees faster than they renew themselves, not only will there be less at our disposal, but the ability of the rainforest to perform its assimilative function of transforming carbon dioxide into oxygen will be damaged.

This is not to mention the other effects of plant and animal extinction. Even abstracting from ethical considerations of the intrinsic value of other species and life forms, this entails the elimination of vast opportunities for humankind and the reduction of precious genetic diversity (including potential medicines, etc.). Causation may also go in the opposite direction: destruction of the assimilative capacity has implications for renewable resources. If wastes are not assimilated, plant life, e.g., may be harmed.

Finally, the limited capacity of the earth's specific assimilative function of heat absorption defines the level and composition of economic activity possible without adversely affecting the earth's temperature. This is related to global warming.

Let us briefly summarize our biophysical conditions for a sustainable economy:

1) First, the level and composition of waste in time and space must be such that all wastes may be transformed into harmless (or even beneficial) products and the ability of the assimilative capacity of the environment is preserved to perform its function in the future, locally and globally. A corollary to this is that all waste that is recyclable or reusable must actually be recycled or reused, unless a particular recycling process uses more resources than it saves or there is some qualitative issue regarding the trade-off. Thus, for the maintenance of the sink function of the ecosphere, $W \leq A$, where W is a vector of quantities of qualitatively and geographically (locally and globally) distinguished wastes, and A is a vector of qualitatively and geographically (locally and globally) distinguished assimilative capacities.

2) Secondly, for renewable resources the rate of utilization must be less than or equal to the rate of renewal, and for stock renewables the stock level must be maintained between the minimum and maximum level. Depending on the particular circumstances, the stock level and rate of utilization should correspond to the maximum sustainable yield. Thus, the maintenance of the source function of the ecosphere for stock renewable resources is $u_{SR} \leq y_{SR}$, where u is the rate of utilization or harvest, y is the yield or rate of renewal, and the subscript SR denotes stock renewable resources. However, this second condition may be modified in the light of the problem of nonrenewable resources, to which we now turn.

3) Even if these first two conditions are satisfied we still have to deal with the fact that the yield of exhaustibles is zero, so that any use of these resources will decrease the amount that we have at our disposal for future use, and may decrease to zero. Thus, the third condition is that there must be a *transformation in the technological structure of production away from exhaustible resource-based, and toward renewable resource-based, technologies*. Some modify the condition for stock renewables in the light of the inevitability of exhaustion of nonrenewables, so that $u_{SR} + u_{NR} \leq y_{SR}$, where the subscipt NR indicates nonrenewable or exhaustible natural resources. Here the total utilization of both renewable and nonrenewable resources must be less than or equal to the yield of renewables, so that as the stock of nonrenewables declines, the utilization of renewables may increase accordingly. But we cannot overestimate the likelihood of a transformation to renewable based technologies in the near future. Therefore, much attention must be paid to strategies to affect the productivity of *all* resources, both nonrenewable and renewable.

4) Technological innovation resulting in increased productivity and efficiency of all resources is necessary. Research and development concentrating on renewables will complement the third condition concerning the transformation in the technological structure of production, but increased efficiency and productivity of exhaustibles is imperative as well. This includes increased regeneration rates, improved resource extraction techniques, improved pollution abatement, increased assimilative capacities, and cultivation of renewable resource stocks (see Lawn, 2001). And again: maximum

recycling is a must (also reuse, reduce, and repair—sounds like a mantra, but is really basic common sense, and justified by scientific evidence).

5) The level and composition of activity must be such that we avoid deleterious thermal effects, and biodiversity must be preserved. Ecosystem rehabilitation and conservation will serve as an important basis for a sustainable and viable system.

These conditions are those that must be met to preserve the ecological basis of the economic activity, but they are in no way sufficient to guarantee necessary material provisioning. It is easy to conceive of the possibility of satisfying these conditions without satisfying the specifically economic conditions for a sustainable economy. For example, we might be able to satisfy the biophysical conditions for a sustainable economy by ceasing all productive activity, but we will then not be satisfying conditions for the material reproduction of human life. The dilemma arises from the need to satisfy both economic and ecological conditions for system viability.

Furthermore, the biophysical conditions cannot simply be *added* to the economic conditions for system viability. The biophysical conditions themselves alter and affect the economic conditions, through limiting and shaping the whole realm of possible choices in the organization of production and distribution.

The reciprocal impact of environmental and economic conditions further influence the degree of flexibility in how system viability is to be achieved. For example, in meeting the necessary conditions for material provisioning, the technology, structure of production and distribution, scale and concentration of productive and consumptive units, and so on, must accord with our biophysical conditions. Likewise, the means by which the ecological basis of the economy is preserved must be compatible with material provisioning.

There is a sense in which the economic conditions set minimums on the system while ecological conditions set maximums: we must produce enough to survive without destroying the earth and ourselves. This is only adequate, however, as a first principle. Besides the minimum quantities of goods to satisfy requirements of provisioning, there is also the composition of those goods and the means by which they are produced, which are constrained by the ecological conditions. Thus, consideration of ecological and economic conditions for system viability narrow the boundaries of possible alternatives in multiple ways, not only defining the upper and lower limits in a quantitative sense, but also through limiting the elasticity of composition of output and the extent of flexibility in the choice of methods of production in the system.

II. Traditional approaches to both unemployment and environmental degradation are insufficient to achieve either full employment or ecological sustainability.

The traditional approaches to promoting full employment range from mainstream neoclassical prescriptions based on the view that unfettered markets will tend to full employment on their own to mainstream Keynesian and Post Keynesian approaches that emphasize demand management via fiscal and monetary policy. In the neoclassical view, if all markets including factor markets are perfectly competitive, the price mechanism ensures that the economy will tend to full utilization all resources, including labor, in the long run. Perfect competition also requires additional assumptions such as all agents must have prefect knowledge and perfect foresight, all factors are perfectly divisible and perfectly substitutable, and so on. The same flexibility that ensures the economy tends to full employment also guarantees that the economy at full employment will easily adjust to structural and technological change. Unemployment is either voluntary or due to market imperfections, including minimum wages, regulations, unions, etc. Deregulation and promotion of competitive conditions are thus called for.

Keynes demonstrated that the neoclassical view of the macroeconomy was flawed and the economy does not tend to full employment, even under competitive conditions (although Keynes also rejected some of the assumptions of the neoclassical model, such as perfect knowledge). Capitalism is inherently demand constrained and thus government needs to stimulate aggregate demand through fiscal stimulus and lower interest rates. But while Keynesian demand management may address the effective demand problem, it does not address the structural change problem:

> Reference to the difference between potential and actual output in aggregate terms … becomes worthless for discussing the condition of accumulation… once the

system has been brought to full capacity by means of short run "Keynesian" policies (Halevi, 1983, p. 347)

A private sector economy stimulated to full employment will experience bottlenecks in production and other structural rigidities that result in unemployment, inflation, and sluggish growth (Lowe, 1976). In addition, Keynesian analysis does not recognize the *functionality* of unemployment and excess capacity in capitalist economies. Firms plan reserve capacity in order to be able to respond to market changes. This translates into excess capacity at the industry and economy-wide levels. Reserve armies of labor are also reproduced in the course of capital accumulation, and the existence of unemployment holds down wages and discipline workers, and provides a pool of workers available to firms as the economy expands. Solutions to the problem of unemployment must address the issue of functionality.

In addition, even if Keynesian demand management could achieve full employment, it could it would be environmentally destructive. Because competition compels firms to base their decisions on private cost minimization, there are considerable obstacles to producing green products, utilizing cleaner technologies and alternative energy. Absent a comprehensive environmental program, expanding the private sector through Keynesian stimulus all but assures increased use of nonrenewable resources, more pollution, and more products with short life cycles and that harm the environment. Pumping up the private sector does not address the issues regarding the composition of output and the technological structure of production, so crucial for sustainability:

> Even if it were possible to expand demand enough to promote growth sufficient to keep pace with labour force growth and productivity growth and mop up the huge stocks of long-term unemployment, how could the natural ecosystems, already under great strain, cope? There is a need to change the composition of final output toward environmentally sustainable activities. It is not increased demand per se that is necessary, but increased demand in certain areas of activity. (Mitchell, 2000, p. 113 n8)

Traditional approaches to environmental problems are not capable of addressing most of the environmental problems that face modern industrial societies. The realities of biophysical conditions impose limits that are unlikely to be captured by the dominant frameworks for dealing with environmental problems in economic theory. In both the Pigouvian and Coasian approaches, social costs and the parties involved are assumed to be identifiable, the costs and benefits measurable. There are plenty of problems with these and other assumptions, and lots of other problems as well—assigning monetary values to life, and health, and nature, for example. But in both approaches, once we get to the "social optimum"—assuming we can get there—whether it is through taxes and fees or through bargaining and assigning property rights, we are left with what is called the "optimal" level of pollution (or depletion). Optimal in relation to what?: in relation to narrowly defined preferences, productivity, and profitability. *But there is no necessary relation between the optimal levels of pollution and resource depletion and the biophysical conditions for a sustainable economy.* In a framework in which everything must be reduced to monetary values, qualitative differences between different costs and benefits in terms of the environmental consequences are not captured.

Actually, a good way of demonstrating the problem is to think about the difference between cost-benefit analysis and cost-effectiveness analysis. In cost-benefit analysis (of which Pigouvian and Coasian analyses are particular forms), the ends of policy are determined by the (economic) analysis itself. The amount of pollution to be emitted, the amount of a resource to be depleted, or wetlands to be preserved, will be the amount corresponding to the equilibrium. In cost-effectiveness analysis, on the other hand, the ends are determined outside the economics, say by a democratic political process informed by scientific information regarding the biophysical limits. Economics is then employed to try to find the most cost-effective *means* for attaining those independently determined ends. This is a huge difference. To get the point across, for some it may be more useful to mention that cost-benefit analysis can be used to derive the optimal level of child labor, the optimal level of slavery, or the optimal level of crime. (this does not imply that environmental damage is ethically equal to slavery. In the case of these examples, they are objectionable because of ethics, the biophysical examples can be thought to be objectionable simply because it makes for an unsustainable system.)

It is not being argued here that standard policy approaches are useless. Taxes can play a very important role. The point is that we should rid ourselves of the idea that we are going to be shooting for an economic equilibrium that guarantees sustainability. As long as biophysical conditions inform the ends, market incentives may be used in cases where they are cost-effective. A comprehensive policy program will have to include a wide variety of policy instruments, from direct regulation to taxes, fees, and subsidies, to transferable permits and quota licenses. Each of these has their strengths and weaknesses, and may be more or less appropriate in different circumstances.

A comprehensive sustainability program is necessary to shift modern industrial economies on to a sustainable path. Meeting the biophysical conditions for a sustainable economy means seriously addressing present rates of nonrenewable and renewable resource depletion, local and global quantities and qualities of emissions, biodiversity loss, soil erosion, and more. Such an initiative will have to address the technological structure of production and the composition of production and consumption. This will be disruptive, in the sense that there will be 'winners' and 'losers'—products, occupations, skills, technologies, firms and industries may become obsolete, new ones will be required, some will become less important, others will become more important. These kinds of structural and technological transformations will exacerbate the structural change problem, already a significant challenge without a major environmental policy program. Absent an effective full employment program, such an initiative will likely exacerbate the unemployment problems of capitalist economies.

III. A Public Service Employment or Job Guarantee approach based on functional finance can achieve full employment, and may also present opportunities to promote environmental sustainability.

Unregulated or badly regulated capitalist economies suffer from persistent unemployment and environmental degradation. Traditional policies to address either one of these problems are unlikely to guarantee either full employment or environmental sustainability. Moreover traditional approaches to full employment, even if effective, would likely result in greater environmental degradation, and traditional approaches to sustainability, even if effective, would probably exacerbate unemployment. Is there a policy program that can achieve full employment and environmental sustainability?

Recent proposals for a Public Service Employment (PSE) or Job Guarantee (JG) program based on functional finance can address both the effective demand problem and the structural change problem. By addressing the issue of the functionality of unemployment, the PSE program addresses the challenges of both attaining and maintaining full employment in the face of inherent deficiencies in aggregate demand and ongoing structural and technological change. Certain characteristic of the PSE approach also present opportunities to address environmental sustainability.

At the heart of the PSE approach is the offer of a job to anyone ready and willing to work. The federal government pays the PSE wage-benefits package through deficit spending. Unemployment is evidence that the government budget deficit is too low. As the government hires the unemployed, the deficit expands. The deficit will stop expanding when there are no longer any unemployed. At that point, the deficit is just the right size to close the gap between the private sector level of activity and full employment. PSE workers can be employed in a variety of services that benefit the community. Since PSE activities are not for profit, they can be designed to promote social efficiency, i.e., broader macroeconomic and social goals.

There are a number of ways in which a PSE program run on the principles of functional finance may be used to help promote environmental sustainability. First, functional finance may be combined with ecological tax reform to reshape market incentive structures to promote environmental objectives. Second, environmental sustainability may be enhanced by the greater flexibility of an economy with a well-managed public service sector. Third, additional environmental benefits may be derived from the activities in which public service workers may be engaged.

Functional Finance and Ecological Tax Reform

Functional finance refers to an approach to budgetary policy that recognizes that under a taxes-drive-money system, national governments do not finance their expenditure with taxation or bond sales. Modern money is not on a gold standard or backed by any other commodity at a fixed exchange rate (except in the sense that it can be viewed as backed by labor under a PSE system). As formulated by Lerner (1943), functional finance means that government spending, lending, borrowing, taxing, buying, and selling should be judged only by the *effects* that such actions have on the economy and society, and not, e.g., whether they accord with the tenets of “sound finance.” No particular relation between, e.g., government spending and tax revenues, is ‘good’ or ‘bad’ in and of itself, independently of the impact the fiscal stance has on the economy. So whether a government budget deficit is good or bad depends on the economic conditions that hold at a particular time and the goals of the society.

While taxes and bond sales do not finance government spending, they do have other purposes (Forstater, 1999b; Bell, 2000). "Taxes should *never* be imposed for the sake of tax revenues" (Lerner, 1951, p. 131, original emphasis). Rather, the purpose of taxation is "its effects on the *public* of influencing their economic behavior" (*ibid*.). Likewise, "borrowing" is not a funding operation; bond sales are a means of managing bank reserves and regulating the overnight rate of interest (Lerner, 1943, p. 355).

There are two broad categories of behavior that taxation is intended to modify. First, taxes (and the requirement that government currency satisfy tax liabilities) create a demand for state money. Thus, the value of modern money is derived from the fact that it is needed to pay taxes. This is what is meant by a "taxes-drive-money" system (Wray, 1998). People accept state currency in exchange for goods and services or as a means of settling debt because they need it to pay taxes or know that it will be accepted by others who need it to pay taxes (or know that it will be accepted by others, etc.). This is what Lerner meant when he argued that "money is a creature of the state" (Lerner, 1947, p. 313). Note here that legal tender laws are *not* sufficient; money's "general acceptability, which is its all-important attribute, stands or falls by its acceptability by the state" (*ibid*.).

The second broad category of behaviors that taxation seeks to modify are those that are deemed undesirable. A tax is levied on unhealthy goods (or 'bads') or technologies and undesirable behaviors to discourage people from purchasing and using these items or engaging in those activities. Note here that this kind of tax is not intended to generate revenue. The goal is not to raise revenue, but to influence behavior. In fact, the success of the tax can be measured precisely by how little revenue it generates. The smaller the amount of revenue generated, the less often people are purchasing the item, utilizing the technology or engaging in the behavior. If considerable revenue is generated, it means that the tax has not been successful in discouraging the behavior. Likewise, tax credits or subsidies are intended to encourage certain behaviors.

Ecological tax reform (here to include not only taxes, but also tax credits and subsidies, quotas, and similar incentive-based regulations) fits very nicely into the functional finance framework. The distinction made by ecological economists between money as accounting information not subject to the laws of physics and real resources that are subject to biophysical limits is also consistent with the functional finance perspective (see Daly, 1996, pp. 178ff.; some of the more 'sound finance' conclusions drawn from this distinction by ecological economists, however, are not consistent with functional finance).

Ecological tax reform begins from the premise that the current tax and regulatory structures of most modern nations are not consistent with sustainable practices. Currently, taxes tend to discourage behaviors that should be encouraged, and encourage behaviors that should be discouraged. Taxes on income and employment discourage work and jobs, while low taxes and even subsidies for nonrenewable and renewable resource extraction and on ‘dirty’ technologies tend to encourage unsustainable resource depletion and pollution. In other cases, behaviors may be currently taxed in the right direction, but either the taxes (or tax breaks) are not strong enough or they need to be coupled with complementary policies for more comprehensive effect. Most proposals for ecological tax reform support “tax shifting,” or moving away from taxes on income, employment, and innovation and toward taxes on resource depletion and pollution (see Hawken, 1993; Prugh, et al., 1995; Costanza, 1997; Lamb, 2001; Roodman, 1998). They also support tax credits and subsidies (as well as some complementary changes in regulatory structures) to promote research and development in alternative energy sources and technologies, recycling, and implementation of more sustainable practices. A land tax is also often recommended, as well as modifications in the tax structure with regard to residential and business construction, buildings, and location.

Managing the value of state money requires a base tax. Taxation needs to be strong enough to create sufficient demand for the currency to maintain its value. Ecological tax reform usually begins with some kind of proposal for ‘revenue-neutral’ changes, but within the functional finance perspective revenue is not an issue. But the proposals for land and building taxes by ecological economists may be adopted to satisfy the need for a base tax for maintaining the value of the currency. A functional finance approach to ecological tax reform can thus begin with an elimination of federal payroll and income (including profits?) taxes, and the adoption of certain land and building taxes (taxing high incomes might still take place, but for purposes of redistribution rather than revenue generation).

The proposal behind a tax on land values, as distinct from 'real estate' taxes that combine land value and building taxes, is rooted in ideas usually associated with Henry George, but that can also be found in other classical (as opposed to neoclassical) economists such as Adam Smith. The basic proposal is to tax that part of the value of land that is unearned, e.g., the part derived from its location. The tax is intended to discourage land from being a speculative commodity, and shift the primary basis for land acquisition to its use-value (Daly and Cobb, 1989). The insight is that land prices would adjust so that even with the land tax, bottom lines stay the same (see Roodman, 1998). The tax can be combined with certain zoning laws, deferments, phase-ins and other complementary regulations to promote desired behaviors and prevent undesired ones, e.g., discourage sprawl, not hurt farmers. There are also versions of this proposal that seek to address fairness issues, e.g., not penalizing those who purchased under different institutional arrangements.

Building taxes, on their own or as part of real estate taxes, unlike taxes on the rental value of land, do discourage improvements, repairs, and upgrades. Some building, building size, and certain features of buildings may want to be discouraged for environmental reasons, but some improvements do not want to be discouraged. This is fairly straightforward: do not tax energy saving improvements, etc. Taxes on the rental value of land, with some building taxes, may then be combined to serve as the base tax for the currency. Other federal taxes may be used to affect behavior.

Changing the tax and regulatory structure is a very important part of the shift to environmental sustainability. Markets do some things well and other things not so well. History has shown us that markets do not necessarily meet biophysical conditions for a sustainable economy, and even contribute to quite the contrary. But market forces may be shaped and steered so that it becomes more cost effective and profitable to use resources wisely and limit pollution, so that it pays to move to cleaner technologies and to recycle. Taxes, tax credits and subsidies, quotas, licenses, low- and no-interest loans, and other tax and regulatory policies must penalize unsustainable behaviors and reward green ones. Such policies can help create new industries and make others obsolete. They can alter the geographic distribution of production so that it is consistent with local assimilative capacities.

Often environmental taxes and regulations will be opposed by business because it means higher costs. There are several important factors that must be recognized here, however. First, if taxes and regulations effect all firms (or all firms in an industry) equally, then their relative competitive position should not be affected. Second, changes reward cleaner, more efficient firms and punish the dirty, inefficient ones. So what if some real dirty monsters of inefficiency go under? Firms that fall somewhere in the middle may decide whether they want to move toward sustainable practices or not, and it is possible that firms that want to go green could be eligible for help making the transition. For example, low or no-interest loans and other resources and incentives could be offered to certain firms that want to move to cleaner practices. Third, if taxes result in higher prices and lower output it is possible that these are more reflective of the true social costs of production. So it is not as though these are new costs so much as hidden costs becoming explicit, and redistributed to producers and consumers of the product. Full cost pricing should be the goal. Fourth, as long as costs are hidden or external, the price system will not be working to promote innovation. Higher costs and higher prices should promote innovation in just those areas where it is desirable. As long as unsustainable practices are subsidized, either by policy or through externalities, research and development into and adoption of alternatives will be less cost effective and profitable. If gasoline prices were high enough, we would start to see alternatives become more attractive. Fifth, these taxes are avoidable—in fact, unlike income and employment taxes, these are taxes we want people to avoid! Sixth, the higher costs during the transition to cleaner practices will be offset by tax reductions in other areas.

Depletion quotas can be a useful tool for promoting sustainable resource use and emissions levels consistent with the assimilative capacity of the environment (see Daly and Cobb, 1989; Daly, 1993, pp. 340ff.). There are a number of advantages to targeting resource depletion. First, depletion is easier to monitor and control than pollution. Second, targeting depletion not only addresses biophysical conditions with respect to natural resources, but also with respect to the assimilative capacity, since reducing depletion of fossil fuels also reduces pollution.

Daly also argues that there are advantages of quotas over taxes on natural resources. Taxes do not guarantee any maximum cap on the rate of resource utilization. Quotas set a definite limit on the aggregate quantity of a natural resource used over time. In addition, if money saved by reducing depletion of one resource due to taxes is respent on other resources, it may only change the distribution of resources depleted, which may or may not be more sustainable.

Daly's proposal is of a market allocation of the quotas through government auction of quota rights. While government will act as a monopolist, buyers of quota rights will behave competitively. Buyers could be limited to a certain number of permits and a certain number of permits of a given resource to promote greater competition (Lamb, 2001, p. 295). Government will earn a scarcity rent. Higher resource prices will promote more efficient use of resources and technological innovation, increasing both conservation and pollution. In addition, recycling will be promoted by the higher prices. For nonrenewable resources with a close renewable substitute, the quota should be set so that the price of the nonrenewable is at least as high as the substitute. Quotas can also be reduced over time, allowing for a transition to alternatives. Permits could have a life of one year, so that the total amount can be modified in the light of changing circumstances. Environmentalists can choose to purchase permits and not use them.

Even with depletion quotas, pollution taxes will still be necessary. Taxes can start out low and be phased in over time in cases where considerable adjustment needs to be made. The key advantage of taxes over direct regulation is that taxing each unit of pollution gives an incentive to reduce as much as possible, while merely setting a cap on emissions does not give the polluter an incentive to reduce emissions further than the maximum allowed. A downside of taxing pollution is that it does not guarantee that emissions will be reduced to an amount that is consistent with the assimilative capacity. One way around this is through the tradable pollution permit scheme. The total amount of pollution is capped, and the market allocates the distribution. Local and global assimilative capacities need to be considered, so most permits will be tradeable only within a certain area.

Taxes and regulations also need to be applied to various materials, such as pesticides and fertilizers to prevent soil erosion and biodiversity loss. Encouraging the move toward organic agriculture will also constitute a move toward more labor-intensive practices that will promote labor demand. Controls on land clearance will also need to be applied. Tax breaks and subsidies can be used to encourage fencing off and manage native vegetation (Lamb, 2001, p. 298). Taxes can also be used to affect not only production but also consumption. Taxes on consumption goods that harm the environment, especially luxury items, can be utilized.

Tax breaks and subsidies can be used to try to promote the locational redistribution of industry. Industrial ecology is a growing field that must be promoted (Jackson, 1993; Allenby, 1998; Dorf, 2001). In an industrial ecology park, several firms are located in geographical proximity. The waste and other residual by-products of one firm are used as inputs by others. The attempt is made to completely close the loop in the production and waste cycles.

This is in no way a comprehensive overview of the tax and regulatory policies of a major sustainability plan. Such ecological tax reform proposals are already in existence and have been referred to above. The weakness of current proposals is their adherence to principles of sound finance. The point here is to show how an ecological tax reform plan can be based on the principles of functional finance, and to give some examples of some of the policies that might be utilized.

System Flexibility and Environmental Sustainability

PSE programs can be designed to endow the economy with considerable flexibility, and this flexibility can be used to promote environmental sustainability (Forstater, 1998; 1999a; 2000a). A private sector running at full employment and full capacity utilization will have considerable structural rigidity, as excess capacity and unemployment allow firms, industries, and the economy as a whole to respond more effectively to structural and technological change and other market conditions. If the private sector is stimulated by traditional demand management policies, competition and other market conditions will determine what additional goods and services are produced, what technologies and inputs are used, how much more pollution will be emitted, the geographic distribution of the additional consumption and production, and so on. Since public service activities are not for-profit, they may be designed according to different criteria. Rather than being designed according to private sector efficiency criteria, public sector activity may be designed with broader social and macroeconomic goals in mind. Environmental sustainability can inform decisions concerning what PSE workers will produce and how they will produce it.

Implementing new environmental regulations and using market incentives to promote a sustainable society will result in significant structural change. Even if such new rules are phased in slowly over time, the kinds of changes needed will result in new firms and industries, new occupations, new products, and new methods of production, with some firms, industries, occupations, products, and methods of production becoming obsolete. There will also be changes in the relative significance of various kinds of products, jobs, technologies, industries, and so on, with some expanding (or expanding at different rates) and others shrinking (or shrinking at different rates). There will also be significant geographic relocation. The more structural flexibility in the system, the less disruptive these changes will be.

Suppose the economy had been stimulated to full employment through traditional Keynesian demand management. It is difficult to imagine how the system could cope with the inter- and intra-sectoral changes in the composition of labor demand, even if aggregate demand could be consistently maintained. Either aggregate demand (or the rate of growth of aggregate demand) would have to be permitted to fall, or else it would likely translate into inflationary pressures as the system attempted to cope with the changes. With a PSE program, however, there is both a job for every worker released from private sector employment who cannot find another one in the private sector and a pool of employed from which the private sector can draw to fill positions that arise. Thus, full employment can be maintained and the transition can be made to a sustainable path with minimal disruption. Flexibility in terms of other resources can also be had with PSE, additionally assisting the shift to sustainability. PSE programs can be designed to make little use of capital-equipment for which demand might be expected to increase during the transition. Thus, because of the way in which it can be managed to promote system flexibility, a PSE program will play a crucial role in minimizing the disruptions associated with the significant structural changes required to move society to a sustainable path.

Since PSE activities are not for profit, they can be designed with broader social and macroeconomic goals in mind, rather according to private efficiency criteria. Since private cost minimization is not the concern, public service activity may utilize different methods of production to perform the same service or produce the same good than it would if it were in the private sector. So public service activities first and foremost can be designed that do not use or make little use of nonrenewable resources, and that do not pollute or pollute as little as possible. These advantages may be gained even if the activity is not concerned with the environment in any other particular way. There are a whole host of almost pure services that can benefit the community and yet use no natural resources and do not pollute. Even if all of the public service activities fell into this category we would still end up with a relatively more sustainable full employment system than if the private sector were stimulated to or toward full employment. PSE activities can also be used as testing grounds for alternative technologies.

Similarly, Public Service Employment activities might contribute to sustainability through the increased geographical or locational flexibility that they have over private sector activities. Private cost minimization compels private firms to locate where it is most profitable, taking into consideration all kinds of factors, such as the location of related markets and industries, transportation and information requirements and costs, and so on. Public sector activities can locate based on social efficiency rather than private efficiency criteria. Since the assimilative capacities of the environment are both local and global, local assimilative capacities can be relieved of stress by locating public sector activities where they will do the least harm. Of course, this must be reconciled with other considerations, such as where the unemployed are located and minimizing family disruption. But just as people often enter the military or the Peace Corps at least in part to travel and to acquire skills, it is not inconceivable that there may be people who would do the same in a public service job. In addition, some of the locational flexibility may be tapped without requiring that people relocate their place of residence. Relieving the local assimilative capacity of stress may only require that the place of work be located elsewhere, close enough to commute.

Traditional fiscal and monetary policies can and will still be used as complements to PSE. If the PSE sector is considered too large, taxes can be cut or other types of government spending may be increased. If the PSE sector is considered too small, taxes can be raised or other types of government spending cut. What if the scale and composition of the private sector, even with ecological tax reform and other regulations, is deemed inconsistent with the biophysical conditions for a sustainable economy? It is possible that a larger PSE sector, with its significant flexibility and appropriate technology, and a smaller private sector, may be warranted. Society will need to find the right balance between private sector (and normal public sector) activity and PSE activity. The right private/PSE ratio for sustainability will need to be discovered, and of course there is no reason to think this would be constant over time. As new technologies and alternative energies (and alternative lifestyles) are discovered, the sustainable size of PSE may change. But PSE provides the flexibility needed to make such adjustments, without the social costs of unemployment.

PSE and Environmental Services: Green Corps

Public Service Employment activities can also help promote sustainability is by performing environmental services of some kind. In fact, it may be desirable to create an Environmental Service Corps, or Green Corps, along the lines of the Peace Corps. There is an enormous array of services that such a Corps might perform that can help society satisfy the biophysical conditions for a sustainable economy. It is not the purpose to provide a full catalogue of the possibilities here, but to suggest a few examples.

One of the primary areas that a Green Crops could focus on would be recycling (here including also reuse, repair, and reduce). Biophysical conditions require that society maximize its recycling efforts, and there is plenty more recycling that could go on now that does not. Much of the work here is labor intensive, and much of the labor need not be specially trained. Recycling has multiple benefits, in that it not only means that society will utilize new materials at a slower rate, but it also diverts materials from landfills and incinerators. Recycling can also result in a reduction not only of new resource depletion but also of pollution, if recycling itself does not pollute as much as new extraction and refining. Reduced use of some materials not only slows the depletion rate, but also leaves resources to perform other environmental services, such as trees absorbing carbon dioxide. Recycling also can reduce costs in many areas.

Major recycling efforts should be divided into at least two major categories, community-based and industrial. Community-based recycling entails collecting, sorting, and cleaning materials, and other jobs that anyone can perform and that contribute to the community and the environment. Repair for reuse entails another whole set of operations and may be considered separately. Repair may be for the original owners or for reuse by someone else. Chicago's "Creative Reuse Warehouse" is a good model for demonstrating how such items as "used office furniture and supplies, salvaged lumber, and broken bikes are turned into valuable assets for communities, schools, and the general public" (Weinberg, et al., 2000). The Green Corps can run both recycling and repair efforts. Industrial recycling zones and parks may also be sites for Green Corps employees to perform certain jobs.

Another major area for the Green Corps could be in transforming homes and some businesses to more efficient and more renewable heating, lighting, and cooling and refrigeration. This does not have to mean every building becomes completely transformed and solar powered, although photovoltaics clearly need to be more exploited, and initial efforts may inspire homeowners and businesses to go further on their own. But even simple and basic adjustments could be performed that would save people money and reduce energy use. Better insulation alone could make a huge impact. Other types of weatherizing are also possible. Green Corps teams could be trained to visit, evaluate, educate, and make suggested or even required changes in a several hour visit (patching areas, fixing items, blocking drafts, installing low-power shower heads).

Another major area that could be addressed by a Green Corps could be automobile use and traffic congestion. Long term sustainability may require larger structural changes and the move to other forms of transportation, but in the short term, a well organized van pool system could reduce traffic congestion and pollution for those areas not served by good transit. The Green Corps could drive and repair the vehicles, and experiments could be conducted with using alternative vehicle types and alternative fuels. A ten-person vanpool cuts unit private, social, and environmental costs to 15-20% of single-operated-vehicle costs (Vuchic, 1999, p. 307). If the van is more fuel-efficient or uses alternative materials or energy, these costs will fall even more.

The Green Corps can also transform many items in the public infrastructure over to solar. There are now effective and reliable pv-powered streetlights, school crossing lights, highway construction warning signs, and billboards (Cole and Skerrett, 1995). In addition to saving energy, decreasing pollution, and reducing costs, public use of solar in these ways will help educate the public about the efficiency and reliability of photovoltaic power.

Another important area for the Green Corps to be involved in is rooftop gardening and urban landscaping. The benefits of both of these are little-known. In addition to producing food (for humans), and food and habitat for wildlife, rooftop gardens and urban landscaping help purify air, soil, and water, and can provide air conditioning, shade, and windbreaks, and provide a productive sink for organic waste. (Milano, 2000, p. 105). Human waste could also be redirected and put to better use than polluting water. Modern composting toilet technologies are available and user-friendlier than ever.

Another area of concentration for PSE workers could be in what might be called Environmental Defense or Environmental Security, and it may be desirable to create a whole section of PSE especially for a Green Security Force. This would be specifically devoted to two major areas, monitoring and clean up.

The new laws and rules will only affect change if there is monitoring to assure compliance. Often, environmental legislation is criticized as being difficult to monitor, and that monitoring can only be done with great effort. PSE can support monitoring efforts, as well as testing. Much testing can be done with relatively basic training. Samples can be collected with almost no training, and returned to labs.

PSE workers can also support clean-up efforts. Obviously there are some types of clean up that require special skills and equipment. But there is a tremendous amount that can be done with basic training, and much that is more or less unskilled. With the support of a well-managed PSE plan, monitoring and clean up can be supported at a level that is consistent with the shift to sustainability.

Environmental sustainability requires that information be disseminated and lots of education take place. From pre-school to the University, in the community and the workplace, sustainable practices cannot be adopted without changing some of our most ingrained habits. Moving from the waste disposal society mentality to the recycle/reuse/reduce/repair society mentality to some extent means socialization and education needs to take place. PSE workers can visit classrooms and workplaces and do presentations. They can set up tables in the community to demonstrate the effectiveness and simplicity of many sustainable practices.

PSE workers can also support research efforts. Research and development costs can be cut significantly with labor available to perform a variety of tasks. Doubtless there are many, many other areas where PSE workers can perform environmental services. The development of a Green Corps will provide a reservoir of labor that can contribute to sustainability in multiple ways. The possibilities are limited only by the imagination. The goal is not to provide a comprehensive listing of such services, but to point to the possibilities for enhancing the environment presented by a PSE program, and to give some examples.

There are two other interesting potential environmental benefits of a PSE program that may be worth mentioning. Since many workers will gain experience in the PSE related to sustainability and sustainable practices, these new skills and experiences will be brought back into the private sector if and when they are hired out of PSE. This could go some way in increasing the variety and level of green skills in the private sector labor force. Another potential benefit of the PSE relates to changing ingrained patterns of consumption, so necessary for sustainability, and also to the increasing interest in ecology and environment in the youth of the 21st century. It is possible that some youth who are dedicated to the environment might desire to be part of the Green Corps even if they could find a job in the private sector. Since PSE jobs are not remunerated extravagantly, some may see a link between their PSE job and more modest consumption practices. It is possible that other non-monetary benefits could be included in the PSE package, to attract citizens committed to the environment and who want to voluntary restrict their own consumption. Here the possibilities range from free higher education for children of PSE workers to housing (possibly in experimental alternative energy run dwellings, etc.) to concert tickets. Another possibility could be for youth to have a PSE requirement, similar to the military or Peace Corps, where they will be exposed to various sustainable practices and modest consumption.

IV. Conclusion

Modern capitalist economies are characterized by persistent unemployment and environmental degradation. Traditional policies to address these problems are severely limited. The Public Service Employment or Job Guarantee approach to full employment based on the principles of functional finance may also contribute to environmental sustainability. This paper has been concerned primarily with industrialized countries, but there is no reason that such a program might not be elaborated for developing countries, taking into consideration the specific economic and environmental conditions found there.

The PSE program should not be looked at as the answer to all of our environmental or social problems. But there is no reason why other policies that can address these issues cannot be developed and implemented in a complementary manner.

Proposals for revising national income accounts to reflect environmental values, for example, should be considered, as should full cost pricing policies. Still, a well-managed and imaginatively designed PSE program could bring tremendous social and environmental benefits.

Bibliography

Allenby, Braden R., 1998, *Industrial Ecology*, Upper Saddle River, NJ: Prentice Hall.

Bell, Stephanie, 2000, "Can Taxes and Bonds Finance Government Spending?," *Journal of Economic Issues*, 34.

Bossel, Hartmut, 1998, *Earth at a Crossroads*, Cambridge, UK: Cambridge University Press.

Brown, Lester, et al., 1999, *Vital Signs 1999*, Worldwatch Institute.

Cole, Nancy, and P. J. Skerrett, 1995, *Renewables are Ready*, White River Junction, VT: Chelsea Green Publishing.

Costanza, Robert, et al, 1997, *An Introduction to Ecological Economics*, Boca Roton, FL: St. Lucie Press.

Daly, Herman, 1993, "The Steady-State Economy," in H. Daly and K. Townsend (eds.): *Valuing the Earth*, Cambridge: MIT Press.

Daly, Herman, 1996, *Beyond Growth,* Boston: Beacon Press.

Daly, Herman and John B. Cobb, Jr., 1989, *For the Common Good*, Boston: Beacon Press.

Dorf, Richard C., 2001, *Technology, Humans, and Society*, San Diego, CA: Academic Press.

Forstater, Mathew, 1998, "Flexible Full Employment," *Journal of Economic Issues*, vol. 32, June.

Forstater, Mathew, 1999a, *Public Employment and Economic Flexibility*, Public Policy Brief No. 50, Jerome Levy Economics Institute of Bard College, February.

Forstater, Mathew, 1999b, "Functional Finance and Full Employment," *Journal of Economic Issues*, 33, June.

Forstater, Mathew, 2000a, "Full Employment and Economic Flexibility," *Economic and Labour Relations Review*, Vol. 11, supplement.

Forstater, Mathew, 2000b, "Savings-Recycling Public Employment; Vickrey's Assets-Based Approach to Full Employment and Price Stability," in a. Warner, M. Forstater, and S. Rosen (eds.), *Commitment to Full Employment*, Armonk, N.Y.: M. E. Sharpe.

Georgescu-Roegen, Nicholas, 1971, "The Entropy Law and the Economic Problem," in H. Daly and K. Townsend (eds.), *Valuing the Earth*, MIT Press, 1993.

Halevi, Joseph, 1983, "Employment and Planning," *Social Research*, Vol. 50, pp. 345-358.

Harrison, Neil E., 2000, *Constructing Sustainable Development*, NY: SUNY.

Hawken, Paul, 1993, *The Ecology of Commerce*, New York: Harper Business.

Inoguchi, Takashi, Edward Newman, and Glen Paoletto (eds.), 1999, *Cities and the Environment*, Tokyo: United Nation University Press.

Jackson, Tim (ed.), 1993, *Clean Production Strategies*, Boca Roton: Lewis Publishers.

Keynes, John Maynard, 1936, *the General Theory of Employment, Interest, and Money*, New York: Harcourt.

Lawn, Philip A., 2001, *Toward Sustainable Development*, Boca Roton, FL: Lewis Publishers.

Lerner, Abba, 1943, "Functional Finance and the Federal Debt," *Social Research*, 10.

Lerner, Abba, 1947, "Money as a Creature of the State," *American Economic Review*, 37.

Lerner, Abba, 1951, *The Economics of Employment*, New York: McGraw Hill.

Manno, Jack P., 2000, *Privileged Goods*, Boca Roton, FL: Lewis Publishers.

Milani, Brian, 2000, *Designing thew Green Economy*, Lanham, MD: Rowman and Littlefield.

Mitchell, William F., 2000, "The Job Guarantee in a Small Open Economy," *Economic and Labour Relations Review*, Vol. 11, supplement.

Mosler, Warren, 1997-98, "Full Employment and Price Stability," *Journal of Post Keynesian Economics*, Vol. Xx, No. xx, Winter, pp. Xxx-xxx.

Prugh, Thomas, et al., 1995, *Natural Capital and Human Economic Survival*, Solomans, MD: International Society for Ecological Economics.

Rogers, Jr., Wyatt M., 2000, *Third Millennium Capitalism*, Westport, CT: Quorum.

Roodman, David Malin, 1996, *Paying the Piper*, Washington, D.C.: Worldwatch Institute.

Roodman, David Malin, 1998, *The Natural Wealth of Nations*, New York: Norton.

Semmler, Willi, and M. Sieveking, 1991, "On the Optimal Exploitation of Interacting Resources," *Journal of Economics*, February, vol. 59, no. 4, pp. 23-49.

Vuchic, Vukan R., 1999, *Transportation for Livable Cities,* New Brunswick, NJ: Rutgers University Press.

Wackernagel, Mathis, and William Rees, 1995, *Our Ecological Footprint*, Gabriola Island, B. C.: New Society.

Weinberg, Adam S., David N. Pellow, and Allan Schnaiberg, 2000, *Urban Recycling and the Search for Sustainable Community Development*, Princeton, NJ: Princeton University Press.

Wray, L. Randall, 1998, *Understanding Modern Money*, Cheltenham, U.K.: Edward Elgar.