

BIBLIOTECA
7739 CIDE

DOCUMENTO DE TRABAJO 10

Economía

THE CONSTRUCTION OF OVER-
AND UNDER-POPULATION:
SOME CRITICAL REINTERPRETATION
OF THE POPULATION PROBLEM

RAÚL GARCÍA-BARRIOS
& PETER TAYLOR



CENTRO DE INVESTIGACIÓN Y DOCENCIA ECONÓMICAS

COLECCION CIDE

Primera edición, 1992

**D.R.© 1992, Centro de Investigación y Docencia Económicas, A.C.
Carretera México-Toluca km 16.5, Lomas de Santa Fe, 01210 México, D.F.**

**Tipografía y cuidado editorial:
Solar, Servicios Editoriales, S.A. de C.V.
Andes 51, col. Alpes, 01010 México, D.F.
Tels. y fax 593-5748, 664-4785 y 664-4886**

ISSN 0185-3384

Impreso en México

INTRODUCTION

Sustainability, steady state economics, and deliberate control of reproduction are serious issues. Serious, not just because of the severity of the environmental problems they address and the sweeping social and economic changes their implementation seems to require, but because these issues call for serious conceptual and empirical work to understand the dynamics of unsustainability, economic growth, and population increase, given that any new social order will be constructed through interventions within these dynamics. There is a substantial body of research in social analysis of environmental change upon which this work should build.¹ Moreover, like all discourses, the prevailing discussions of sustainability and so on, usually expressed in very urgent and serious terms, invite interpretation, that is, analysis of the deeper conceptual structures and rhetorical strategies employed. This is particularly so given that the idea of progress informs Western intellectual discourse in many ways and the consistent incorporation of limits would constitute a conceptual revolution. We intend this critique of neo-Malthusian Population discourse to stimulate progress in understanding the dynamics of socio-environmental change and in interpreting environmental discourse.

To conceive of a human population supporting a long term sustainable economy entails conceiving of the construction and the dynamics of durable and social institutions that will regulate the economic, moral and political relationships within such a population. These institutions must provide the incentives and restrictions to stabilize the extraction and management of natural resources and guarantee their continuous (or increasing) replenishment. Moreover, because sustainability refers to the way people live more than to resources, the institutions must generate synergisms among efficiency, equitability, cooperation, knowledge and participation. The social dynamics must be free from major conflicts and contradictions among the agents, and from collective pathologies due to fear, power manipulation and political mystifying discourse. They must provide for the realization of the basic needs and impulses of women, men and their social groups, including their desires for subsistence, protection, affection, understanding, participation, leisure, creation, identity, liberty and transcendence (Max-Neef *et al.*, 1986). Most importantly, however, because sustainability is a social and collective enterprise it must be constructed out of today's social relationships as they have been shaped by history.

Present social relationships and institutions are far from being sustainable and free from conflict and social pathologies. All social agents seem to actively

contribute to the accelerated depletion of natural resources. How is this situation to be understood? The structure of the conventional discourse and implemented policy concerning the relationships among population, social organization, technology and the environment that generate unsustainable use of resources is as follows:² Poor populations, which currently comprise more than 80% of the overall world population, increase their numbers rapidly and aspire to increase their consumption, while affluent populations consume resources disproportionately, maintain their interest in wealth accumulation, and resist any reforms that could impair the market income generating system. Together, the activities of both poor and rich have led the human species to exceed its carrying capacity and to stand at the threshold of a major catastrophe. Despite their joint contribution to resource degradation, most accounts imply a basic difference between the rich and the poor in their potential to construct sustainability. Affluent populations belonging to rich and poor countries can afford materially and psychologically to restrict their numbers and consumption, and, because of their high levels of wealth, education and power control, they have the means (although not always the conviction) to imagine and construct new social values, institutions and technology to respond to social needs and the sustainability challenge. Meanwhile, the massive, uneducated poor populations seem to be organized around primitive, weak and inefficient economic and social institutions, which restrict and bias their ways of generating an endogenous creative response to new challenges in population control and adequate resource management (as against some externally imposed response). Poor human populations are deeply involved in a vicious cycle with environmental degradation: led by their poverty, poor populations increase their number and/or mismanage or deplete their resources, which feeds back on the conditions of the poor by reducing land productivity, increasing pollution, and limiting future income options. They are also caught in a vicious economic-technological cycle: because of their lack of "physical and human capital" and their distorted economies, they are unable to innovate efficiently and competitively, which further restricts their capacity to acquire necessary new capital and correct their economic distortions. Formally, unsustainability may seem to have one of its deepest roots in the immoral greed of unenlightened members of affluent populations. For all practical reasons, however, the critical factors are seen as the size and rate of growth of the population, poverty, ignorance, economic distortion and poor technology, in that order. Therefore, population control, external education, welfare programs and economic advice (e.g., "economic-ecological" adjustment in the recent tradition of the World Bank) prescribed by educated and morally authoritative individuals and organizations coming from the affluent side of modern societies seem to be necessary to guide the poor into sustainability, and, at the best, to obtain a universal Pareto improvement or, at the least, to avoid the catastrophe.

Although we recognize certain insights in this conventional discourse, the first part of this essay (section 1) significantly reformulates the description of the dynamics connecting population and environmental degradation, casting serious doubt on the prescribed moral and technical flows for provoking sustainability. We concentrate on the contribution of neo-Malthusianism to the construction of the environmental orthodoxy above, but we believe our critique can be extended to the related discourse centred on poverty, which includes the so called heterodox neoliberalism or adjustment with a human face currently advocated by the World Bank to most Third World countries. Also our analysis and examples will emphasize the situation of the rural poor, but we believe that the argument extends to discussions about the population dynamics of the urban poor. Some earlier critiques of neo-Malthusianism have identified racism, sexism, and eugenic ideologies underlying population control policies (Harvey, 1972; Mandami, 1973; Mehler, 1989), but in the second part of this essay (section 2) we advance an additional interpretation of its popularity and persistence, pointing to what we characterize as a moral-technocratic construction of the science and politics of population discourse. (One could analyze the constructions of population control that are more purely technocratic, analogous to the structural adjustment policies imposed on Third World economies since the 1980s. We have chosen, however, to highlight the combined moral-technocratic dimensions of neo-Malthusianism, considering this interpretation to be more applicable to environmentalists.)

We set the scene in section 1.1 by reviewing the current joint crisis of environmental degradation and loss of economic-technical confidence and interpreting the conventional view of the Population problem (capitalized in this essay to denote the numerical demographic sense) as a consensus response to this crisis. "Consensus" meaning that the interpretation of the crisis and policies for overcoming it do not threaten the institutions of economic production and accumulation, especially the market. This consensus response pays little attention to the social dynamics connecting the poor and affluent populations, allowing poor and affluent to be conceptualized as essentially distinct categories. In section 1.2, in contrast, we analyze the transformation of the relationship between poor human populations and environmental dynamics that resulted from the historical construction of the self-regulated market economy, in which affluent populations have always been active and interested participants.

Central to our analysis of both the conventional views and the social dynamics of resource degradation is a reinterpretation of the concept of labour surplus. This was originally introduced by Arthur Lewis (1954) to characterize what he considered the *primitive productive condition* of "traditional" societies in underdeveloped countries. According to Lewis, in those societies the physical relationship between a large population and scarce resources led to a null marginal productivity of labour. Supposedly, the existence of a large portion of non-produc-

tive labour, or surplus labour, in the pre-modern sector provided developing countries with a mechanism of growth that was economically (and hence institutionally) neutral to rural productivity. As Lewis pointed out, in such conditions "the holding... is so small that if some members... obtained other employment, the remaining members could cultivate the holding just as well" (Lewis, 1954, p. 141). Lewis' assumption of pre-modern human populations' *intrinsic inability* to stimulate their own conditions for production underlies most analytical views of the relation between poor societies and ecological change. It certainly permeates any effort to restrict the concepts of population and growth rates to statistical descriptions of groups of consumers having an impact on the environment, as in the neo-Malthusian paradigm.

In section 1.3 we criticize the Lewis assumption and argue that as a consequence the dominant concept of human overpopulation is incorrect. Labour surplus is not an inherent feature of poor human populations, but a consequence of the continuous process of institutional disruption and conflict enhancement that accompanies what could be called the "permanent modernization" of Third World countries. Furthermore, the process by which labour surplus is continuously created and destroyed by market dynamics has a deleterious effect on labour's productivity precisely because it reduces its capacity to enhance natural resource conservation and regeneration. In other words, the dynamics of labour surplus continuously undermines the maintenance or potential evolution of the economic and social institutions necessary for sustainable resource management in poor rural and urban societies. The growth of the population of poor consumers must be interpreted as the continuous generation of disorganized and marginalized social labour, and this, not some abstract Population rate of increase or ultimate carrying capacity, determines the relevant techno-ecological processes and bio-physical limits to economic and population growth. These bio-physical limits currently determine the "feedable" (not to mention other essential "tables") limit to population increase to which many societies seem to approach simultaneously as we reach the end of the twentieth century. The extent to which they are socially determined will become clear as we demonstrate that a reduction, not only an increase, in a population's absolute size and growth rate may cause environmental degradation, for example, through the institutional and technological disruption that accompanies massive semiproletarianization of rural populations in modern poor economies.

Hence, overpopulation is not a well-posed problem. In its usual terms, Population is an insufficient and often misleading description for understanding and counteracting the causes of environmental degradation. The Population problem abstracts from the set of complex processes involving social organization and technological change that underlie the population-resource interaction, socially determining the relevant bio-physical limits to growth. But this raises a serious interpretive challenge: How do we account for its continuing popularity

among environmentalists? In section 2 of this essay we interpret the Population problem as a moral-technocratic framework that emphasizes people's common interests in remedial environmental efforts and steers attention away from the difficult politics that result from differentiated social groups and nations having different interests in causing and alleviating environmental problems. This framework for social and political action systematically nullifies poor populations' capacity to contribute actively to counteracting the causes of environmental degradation, and reduces them to objects of policies shaped thousands of kilometers away from their social reality. Although this bolsters neo-Malthusian analysis by obviating the need to analyze the social organization of the poor, we argue that such a framework does not provide international policy makers with the means to understand the ways through which poor populations rationally respond to the social circumstances in which they define their survival strategies. Moreover, moral-technocratic policies increase the probability of unintended effects and undesirable surprises, thus increasing the lack of mutual comprehension and trust between the sectors involved in the solution of the environmental problems. Under such circumstances, frustration, intolerance or even desperation may easily develop, feeding the fears generated by crisis rhetoric, and thus facilitating coercion or violence in order, ironically, to preserve the possibility of future human or other life. Violence, however, defeats its own purpose, since it can never provide the social and psychological basis for the construction of long-term sustainability.

1. THE SOCIAL DYNAMICS OF POPULATION AND ENVIRONMENTAL DEGRADATION

1.1. *Population Policies as a Consensus Solution to Economic-Ecological Crisis*

The last few years have seen a synergistic convergence of many people's sense of environmental and economic troubles. What underlies this decline in confidence in economic growth and environmental sustainability? We set the scene for our subsequent discussion (in sections 1.2 and 2) by reviewing this situation and interpreting the conventional view of Population and resources as a consensus response to this joint economic-environmental crisis.

In modern capitalist societies, the resource depletion problem partly reflects high individual consumption and partly the allocation of social investment in non-natural capital. Affluent rational individuals will maintain high consumption if they don't care about the future or if they expect a continuous or even increasing flow of income for them and their children, while firms investing in rapid resource depletion will continue to do so if they expect to allocate their

maximized returns on new profitable investments (e.g., new resource exploitation enterprises, new manufacturing industries, financial assets, etc.). Overconsumption thus corresponds to high discount rates or expected rates of return for capital investment. For years, high expected returns were supported by the belief in the unrestrained capacity of science to generate new and creative knowledge and of the inter-temporal market system to wipe out the possibility of absolute scarcity by efficiently allocating relative scarcity and inducing technological innovation (Whittling, 1931; Ruttan & Hayami, 1984; Hartwick & Olewiler, 1986). Although today many would consider these beliefs to be a product of wishful thinking, for the generations living after World War II they were supported by what was then considered as uncontrovertible evidence. The Green Revolution appeared to remove the specter of food scarcity once and for all by reducing agricultural absolute scarcity to that of capital scarcity, while the innovations in the chemical and nuclear industry gave the impression that human enterprises were capable not only of transforming but also of creating, without limit, energy and new raw materials.

The history of the breakdown of this utopia is familiar to us all (Turner, 1990). Beginning in 1973 with the oil crisis, the affluent populations of the world have increasingly become aware of the limits of human scientific and technological achievements. The Green Revolution resulted in soil deterioration, overdrawn aquifers, widespread pollution problems and troubling social dislocation. The Three Mile Island and Chernobyl accidents showed the current technological limits of nuclear generated energy. The specter of the greenhouse effect and of the Antarctic ozone hole has made evident the unsustainable technological basis of most of modern human industry. Meanwhile, the market system has failed to provide adequate signaling of resource depletion (Meadows, 1972; Ehrlich *et al.*, 1977; Norgaard, 1991). Unavoidable negative externalities appear from the impossibility of defining private property rights for most ecological processes and natural resources (e.g., biodiversity) and make private and social costs differ from each other in most enterprises of resource management. At the same time, price and quantity rigidities due to market and non-market imperfections systematically reduce the system's capacity to efficiently and rapidly allocate (and redistribute) labour and resources according to new demand requirements. Hence, a catastrophic and chaotic price dynamics has characterized resource markets in the last few decades, hardly accomplishing the role of scarcity global signaling for individual and collective agents. Together with other economic difficulties, the increasing consciousness among governments and the public on the current lack of economic sustainability has increased the social tensions that typically accompany the market income generating systems (Polanyi, 1975; Naredo, 1986).

Other modernist utopias have also crumbled in recent years, particularly those concerned with the development of "underdeveloped" countries. In most

Third World countries, the construction of the modern-industrialized sector was supported by the accumulation of unbearable national debts and anti-agricultural policies, which have in turn inhibited the process of capital accumulation. Meanwhile, compensatory institutional rents were distributed highly unequally across producers, products and regions as their allocation responded to the forces of rent seeking³ and political priorities (De Janvry *et al.*, 1986). The resultant price distortions in the agricultural, forestry and livestock sectors induced capitalist enterprises to seek capital accumulation by rapidly depleting natural resources, introducing environmental-disrupting agricultural technology and abandoning land conservator practices. For example, massive deforestation of the lowland tropics in Latin America was exacerbated by credit and fiscal incentives to the livestock sector provided by national and international agencies (Feder, 1977; Downing *et al.*, 1992). With the onset of the debt crisis in the 1980's, implementation of stabilization policies has produced a decline in public investment associated with global fiscal austerity to combat inflation, the destruction of jobs in the modern sector, and a sharp decline in the real income of poor populations (Cornia *et al.*, 1987). Meanwhile, a weakened agricultural sector has proven unable to absorb the expelled labour force, which, together with the young newcomers to the labour market, has drastically increased the unproductive population. National migrations of the landless to the cities have extended their scale and become migrations from poorer regions and nations to richer ones, increasing social and racial tensions in the latter.

International market economies seem therefore to be at a major crossroad, and it has become increasingly clear that major non-market institutional reforms at the national and international level are necessary to overcome the global crisis of sustainability. Some radical reforms, carefully addressed as non-revolutionary in that the market system and individual choice are preserved, have been proposed. For example, in his book *Steady State Economics* (1991), Herman Daly proposes a set of new institutions that extend private property rights and the market system to include control on aggregate birth and aggregate throughput, while limiting the concentration of wealth, political power and resource control. At the same level of generality, Richard Norgaard (1991) has proposed the recognition of property rights for future generations. In both cases, intra and intergenerational redistribution of wealth in both the First and the Third World are recognized as necessary conditions for attaining sustainability. However, most governments, affluent agents and members of the academy would reject this kind of proposition. One counter-argument has been that increasing affluence stimulates improvements in science and technology and encourages appreciation of beauty in arts and in nature. The affluent are in a position to demand more and better and pay for it. In the First World the affluent are the people who initially fund technological and cultural breakthroughs, while in the Third World they maintain the effective demand

for industrial products. This type of argument is not very convincing to us, but there are deeper reasons why such radical reforms will be resisted. As has been clearly recognized since classical economics in the 19th century, capital investments to establish or maintain a market or to produce commodities are highly volatile, and may easily flow away from any region or country trying to establish constraints on accumulation. Such outflow then threatens the whole mechanism of income generation for all economic classes. In the present economic conditions, in which rich and poor countries compete to attract capital and are haunted by market failure and economic depression, redistributive reforms which impose serious limits to accumulation are doomed to be rejected. Instead, and not without contradictions, national states and international agencies restrict themselves to slowly and carefully bargaining new standards and incentive schemes that could attract corporations and investors to ecologically sound enterprises defined at the local and global scales.

Given the resistance of those with an interest in capital accumulation, few policies with a general and clear impact on development and sustainability can generate political consensus at the national and international levels. Modern neo-Malthusian Population policies, however, seem to pass the consensus test. The neo-Malthusian Population problem is focussed on the large number of poor people rapidly increasing their number and pushing to increase their consumption, thus leading into the vicious cycle with land degradation described above. It is a very general diagnosis, since it pertains to more than 80% of the world's population and affects a large portion of the world's resources, including those directly managed by the poor and those exploited in response to their increasing demand. Also, its solution seems to benefit directly and immediately all social sectors, and therefore generates the basis for political consensus. Political opposition is further reduced because we see little mention of the economic dynamics of the social system and, instead, a large part of the Population problem appears to reside at the atomistic individual level, that is, it involves individuals' uninformed, short-sighted and amoral decisions on reproduction and consumption. Given the need to change individuals' decisions, education and informational programs seem a particularly appropriate policy—some programs directed at the poor, particularly poor women, to change their reproduction and consumption values—and others directed to the well-off to change their consumption practices. According to this consensus only through both routes will poor countries change their development values and accept Daly's Impossibility Theorem: the world's resources cannot support today's 5.5 billion at an upper-middle-class standard of per capita resource consumption. For information and education programs to be successful they will have to carve deeply into the consciousness—and sometimes further away, into the socio-biological propensities—of every human being.

Another aspect of the consensus character of the neo-Malthusian Population

problem operates at the social level rather than individual. To diversify their income opportunities and increase their expected income poor families tend to increase their number of offspring. That is, large families might be part of their survival strategy. Hence, to counteract high rates of birth the poor should be fed, even before being educated. This idea matches perfectly most national and international adjustment welfare programs, and expresses the current consensus of all social classes and serious political thinkers, with the exception of the most radical and utopian economic liberals (who may admittedly undermine this consensus).

In summary, according to a large number of national and international commentators (e.g., the World Bank), education to change people's consumption and reproductive values, together with efficient transitional assistance programs to combat poverty, seem to be the most powerful and viable solutions to the Population problem, and thus an optimal way to construct the basis for sustainability. The second Brandt Report (1983) illustrates this view

Unless broadly based development reaches and changes the lives of ordinary people, population growth will continue. Only as education spreads, as health programmes continue to keep children alive, as families have secure incomes which do not depend on increasing their numbers, will incentives for large families disappear and population growth be kept within manageable bounds (p. 79)

1.2. *The Neo-Malthusian vs. Socially Organized Population*

The power of education and direct welfare assistance to deter the vicious cycle between poverty and environmental degradation has not, however, been demonstrated in any practical way. In this section we argue that more than a simple continuous change in attitude, an impact on the dynamics of the neo-Malthusian Population needs a complete phase transition in the behavior of the Population. We claim that such a behavioral phase transition cannot be achieved by invoking some current regional or future global crisis of bio-physical limits nor by programs centred on health and contraception education and on transitional welfare assistance, because they do not embody a dynamically sufficient description of the relationship between population and environment. To support this claim we first have to discuss the concept of labour surplus and illustrate the crucial role of social organization in the dynamics of population change and resource use.

A metaphor from the physical sciences may help clarify this image of a phase transition in Population and the idea of dynamic sufficiency. Imagine a cylinder of gas not too far from room temperature and atmospheric pressure. If we

measure its volume, temperature and pressure we will find they fit the well-known relationship $P * V = n * R * T$. Now, temperature and pressure are actually statistical averages of a huge number of moving molecules, yet these synthetic variables are sufficient for us to understand and predict the interrelations among volume, pressure and temperature within certain limits. On the other hand, if we want to understand phase changes we need a description of motion of the gas molecules that incorporates their distribution of speed, not just their average. The temperature of boiling water can be measured, but knowing this does not allow us to understand why water boils rather than just getting hotter when we heat it to this temperature. Similarly, to understand major shifts in the Population dynamics aggregate statistical variables (e.g., population size and growth rate) do not provide a sufficient description of the causes underlying any qualitative changes in their dynamics and so we must explore the underlying processes.⁴

1.2.1. Labour Surplus and Social Organization

Let us move into a specific discussion of the dynamics of human populations by considering Esther Boserup's argument in her book *The Conditions of Agricultural Growth*. She challenged the conventional neo-Malthusian argument by stating that population, resources and technology are linked in a progressive manner, because population pressure provides a useful economic stimulus to technical and institutional innovation. Her claim was that population pressure on land pre-conditions agricultural progress and institutional adaptation, which then allow unprecedented levels of population concentration. At a first view, Boserup's argument seems quite reasonable. Also, her thesis has been somewhat supported by large-scale historical evidence on the evolution of the world's agriculture. However, as must be evident from the last section's discussion, Boserup's mechanism is not operating universally, since technological and institutional adaptation has not occurred in most present poor societies. Why has Boserup's expected stimulus stopped functioning, allowing the existence of overpopulation or, in fact, allowing resource depletion for any other reason?

Two answers can be obtained from our previous discussion. First, the capitalist market mechanism is not an efficient and flexible monitoring system of natural resource scarcity, and thus any lags in the transmission of resource depletion caused by population increase or any other cause will result in responses not being technologically and institutionally sufficient; second, and more relevant to this essay, the major part of the poor human populations of the world—which constitute in effect the neo-Malthusian Population—also constitute an *unproductive, capital-scarce labour surplus*. In contrast to Lewis' interpretation, however, we conceive of such labour surplus not only as labour

with null marginal productivity —as Lewis defined it— but also, and more fundamentally, as *labour that cannot be endogenously reorganized to improve, in the short-run, its productive efficiency through collective action or technological change*. Because they mainly constitute an “*organizationally-restricted*” *labour surplus*, poor overpopulated human societies cannot produce major shifts in their productive capacity in response to their own increasing demand, so Boserup’s link between population pressure and agricultural progress and institutional adaptation is broken.

The origins and dynamics of the poor’s inability to organize collectively, and thus of organizationally-restricted labour surplus, may be subject to different interpretations. In his theory of development, Lewis implicitly assumes it is due to an intrinsic characteristic of large traditional populations and is determined by physical resource restrictions (i.e., to scarcity of physical capital and land relative to population size). Hence, for him the only way to transform labour surplus into productive labour is through its absorption by the modern industrialized sector, that is, to upgrade the surplus as human capital. With some minor qualifications, this interpretation also underlies the neo-Malthusian concept of Population. For neo-Malthusians, the relevant aspect of poor populations dynamics is the increasing rate of consumption —and hence resource depletion—, while their productive and organizational capacities to become efficient and to preserve the use of resources are considered irrelevant for theoretical and policy purposes. Neo-Malthusians have a lot less confidence in the capacity of modern-industrialized economies to absorb labour surplus or reduce resource over-exploitation, and hence they emphasize ultimate bio-physical limits and put all their policy efforts in stopping the resource-consuming labour surplus from increasing and depleting the natural capital. Nevertheless, they believe in the need to increase the Population’s human capital and moral education, so that it can be eventually and gradually incorporated into a modern sustainable sector that is presently being conceived and constructed by moral authoritative and scientifically informed members and organizations of the affluent populations. In contrast to Lewis and the neo-Malthusians the following two sub-sections present a more general and powerful interpretation of the origins and dynamics of “*organizational-restricted*” labour surplus, and thus the socially determined bio-physical limits experienced by the poor.

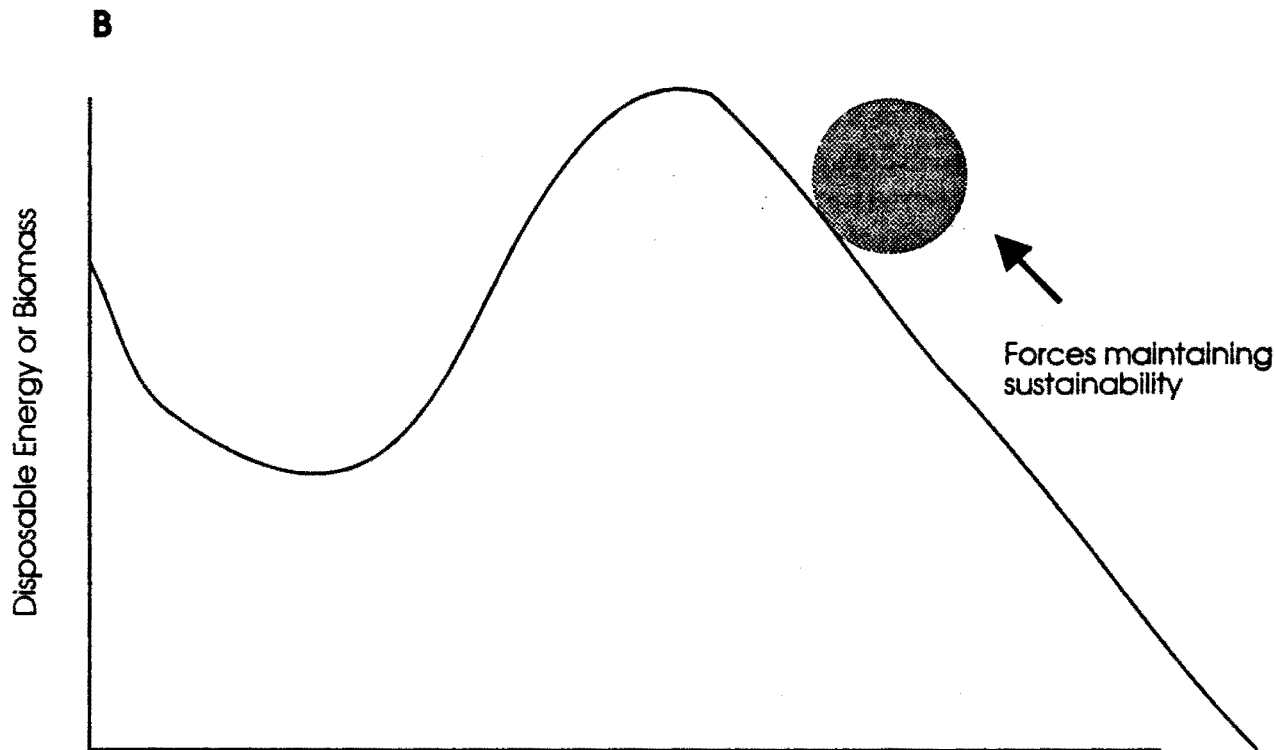
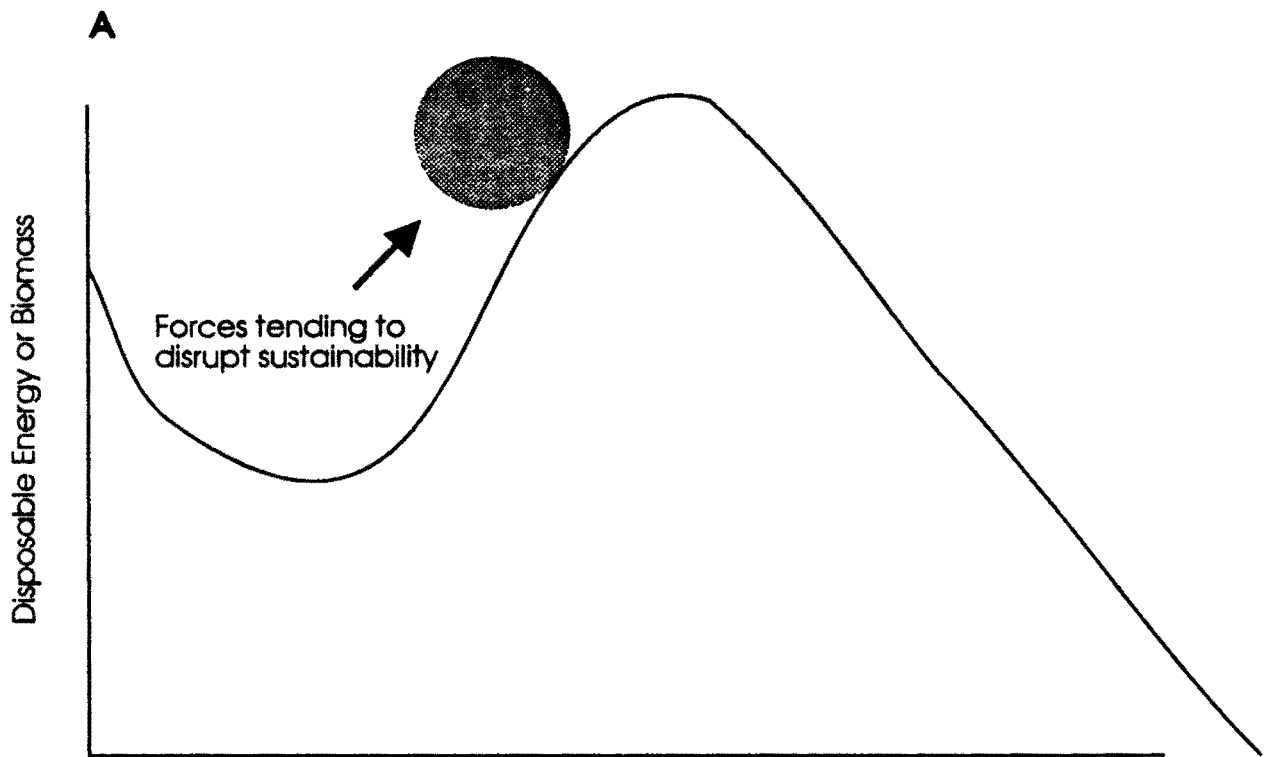
1.2.2. Some Structural Conditions Contributing to Poverty and Resource Degradation

Although we place labour surplus at the centre of our interpretation of the economic and institutional changes connecting poor populations and their environment, we should first mention other structural factors and policies

present in most Third World countries that contribute to the continuous production of generalized poverty and disruption of social organization, and hence exacerbate the double interaction between poverty and environmental degradation. Poor populations are not economically isolated, but participate in a series of institutional and economic relations with other social groups and the State which involve various market and non-market transactions at the local and regional levels. They include: 1) unfavorable economic policies and public investment priorities; 2) structural and institutional contexts that are unfavorable to rural development including inegalitarian land tenure systems and institutional biases against small-holders in the definition of and in their access to public goods and services; 3) economic policies and technological biases that reduce employment creation in both the non-agricultural sector and in commercial agriculture; 4) household-specific market failure, economic discrimination and adverse selection in the labour, product and credit private markets; 5) monopolistic power in local formal and informal markets; 6) compulsory transactions which, like the method of usury, lead to the expropriation of their resources; 7) direct private and State coercive violence. Many of the transactions established by the poor constitute part of their survival strategies; however, once established most become involuntary and compulsory, and many reproduce at the same or greater scale their poverty and dependency conditions (Barter, 1979; Bhaduri, 1983; Watts, 1983; Bardhan, 1984; Binswager & Rozensweig, 1986; De Janvry & García-Barrios, 1988)

These institutional and economic relations determine the existence of socially determined *formal* overpopulation and bio-physical limits. That is, even where the absolute size of the population is not a significant problem and the ultimate carrying capacity is far from being reached (the situation in, for example, most rural areas of Latin America and Africa), structural conditions of land tenure and resource distribution, and larger socio-economic forces that restrict employment creation and enhance social and geographical mobility, may cause an escalation of consumption pressures due to population growth or any other cause (e.g., increasing poverty due to economic adjustment) on the natural resources and therefore lead to their depletion. (Destruction of rain forests in Latin America, particularly in Amazonia, and the use of marginal lands in mountainous areas are partial examples of formal overpopulation). Of course, the problem becomes more severe as the population gets larger and the socially determined formal bio-physical limits are reached. Together with the intense use of the "Green Revolution's" environmentally unsound techno-fix, the doubling of India's population in less than twenty years led to the overdraft of aquifers, soil poisoning and widespread pollution problems in the major poles of agricultural development (e.g., the Punjab), and thus, to an overall crisis of food sufficiency. However, similar experiences in countries with no absolute population problem or large consumption pressures (e.g., most countries of Latin

FIGURE 1



America) show that population growth is only one of the critical factors involved in this type of Third World environmental and agricultural crisis, the other being the widespread presence of income, technological and institutional poverty determining an extremely weak supply response of rural producers in most agricultural regions. Finally, the above causes of structural poverty also determine the moral and social circumstances that underlie all rational responses of the poor households and define their survival strategies. Therefore, they are at the basis of the poor's rational reproductive behavior that leads them to increase the number of their expected offspring even beyond the formal bio-physical limits. Overall, they explain a large part of the increasing poverty-led over exploitation of natural resources.

1.2.3. Institutional Insufficiency— Its Origins and Environmental Consequences

Although the structural conditions of the poor mentioned above are important in explaining the contribution of the poor to environmental degradation, they do not address the specific microinstitutional changes and social relations established by the poor that have reduced their capacity to reorganize endogenously so as to stimulate collective action and technological change. It is this *Institutional Insufficiency*, that is, their inability to build up contracts and associations to sustain desirable efficient production and resource management, that generates "organizational restricted" labour surplus and what neo-Malthusians interpret as a Population problem. *This institutional insufficiency has severely undermined the organizational basis of agricultural conservation practices with which rural populations have traditionally stimulated the regeneration of their natural resources.*

These ideas need further exploration. For centuries, rural societies have practiced agriculture under very difficult agronomic conditions. In general, agriculture in areas occupied by the poor has been far more risky and demands much greater technological resources and conservation management than agriculture in the areas usually occupied by modern agriculture. In the former, additional human resources are necessary to conserve nature's potential for sustained production or biological diversity. Many of the fragile landscapes of the world have been profoundly transformed since ancient times, and may easily become susceptible to degradation (e.g., loose their topsoil, suffer from weed invasion) without continuous human care. Thus, *the incapacity or unwillingness to supply the necessary physical and organizational resources to properly cultivate the land and manage conservation practices may have major consequences for productivity and conservation of the environment.* In Figure 1 we show resource stability diagrams to clarify this idea. Figure 1 (A) represents the usual

way in which resource management is conceptualized. In this figure different forces that stimulate the population to exploit the resource push it out of its stable condition and uphill until a resiliency threshold is reached. At this point, one considers the resource to be over-exploited: secondary regeneration is no longer able to return it to its natural condition, and the resource rolls down the hill to a new stability condition, usually its degradation or extinction. Most theories about the poverty-environmental feedback conceptualize the problem in this way. What varies among them is the importance they give to the contribution of different forces (and therefore the policy implications) that cause poverty and push the resource uphill and into the threshold. In recent years, however, different scholars have begun to gather evidence that supports a complementary hypothesis to explain the two-way interaction between environmental degradation and rural poverty, and that is changing our concept of the role of population in the dynamics of rural societies. Such hypothesis is represented in Figure 1 (B). In this case, the environment has already been deeply transformed and thus the threshold has been reached and surpassed, but various social conservative forces are sustaining the resource from rolling into disaster. Therefore, the failure in the capacity of these forces to work efficiently may precipitate the resource into its degradation and extinction. Our claim is that modern social relations established by the poor as part of their survival strategies may provoke such failure by inducing local institutional insufficiency and absolute labour scarcity.

In many parts of the world, natural resources, including topsoils, rainforests, water bodies, etc., have reached the condition shown in Figure 1 (B) a very long time ago, but continue to persist because of continuous human care. Consider two examples where this situation prevails:

Terracing in Mountainous Areas. All around the world and since very ancient times, human groups have performed landscape transformation to stimulate agricultural sustainability. Most important have been the management of steep slopes in mountainous areas, where rural societies have constructed landscape leveling, terraces, and land containers. This infrastructure must stabilize the soil dynamics to reduce erosion or may even stimulate soil accumulation. However, this is only true if it receives continuous and proper maintenance, since this type of landscape transformation also introduces into the landscape severe slope instability. This maintenance, requires large labour or capital inputs, which have to be collectively provided, because, for example, processes of land and infrastructure degradation occurring uphill will have effects downhill due to siltation. Hence, local cooperative institutions are clearly a technical requisite for infrastructure installment and maintenance in rural areas. After the conquest and colonization by European people of many mountainous areas in Latin America, Africa and the Middle and Far East, the local

increased. In other words, formal overpopulation (sometimes even combined with absolute underpopulation) has appeared or been exacerbated because of the lack of adequate institutions. All this has occurred in local and national societies where the State has not been able or willing to induce the innovation and diffusion of technologies for sustainable agriculture adapted to the new labor conditions nor to generate institutions able to provide adequate public goods and the means of internalizing the externalities which have arisen.

In summary, urban-oriented industrial development, characterized almost everywhere by macro anti-agricultural and anti-peasantry governmental policies and extensive semiproletarianization, has undermined the familial and collective institutions that through coercion or consensus have traditionally induced sustainable resource management. Moreover, developing local and national societies have been unable or unwilling to provide technologies or institutions for a sustainable agriculture adapted to the new labour conditions. In many rural areas there is no longer a system of institutions able to perceive or respond to environmental degradation or to provide adequate public goods and services to control and transform the negative ecological consequences of rural "modernization". Instead, peasants accommodate individually to environmental degradation in order to minimize their commitments of monetary and labour resources. Thus, institutional distortion and insufficiency may be a consequence of market development, and has occurred in rural areas in spite of an increase in the opportunity cost of labour, in spite of the increase of technological opportunities, and, many times, in spite of the increment of land availability. The loss or distortion of social organs to perceive and act locally against environmental degradation has proved to be tragic for natural resource maintenance in many rural areas.

1.2.4. The Minimal Role of neo-Malthusian Policies in Deterring Resource Degradation

We may now go back to the initial claim of this section that a simple continuous change in attitude is not sufficient to provoke the needed phase transition in the behavior of the Population. The previous discussion clearly shows that a change in the poor's capacity to reorganize their own means of existence is a necessary, but overlooked condition for attaining sustainability in resource use. The link between poverty and resource degradation may only be broken by improving the endogenous capacity of poor societies to reorganize and improve their institutional means for collective action and technological change, that is, by improving their capacity to reduce organizationally-restricted labour surplus. Neo-Malthusian programs centred on education and welfare assistance have little relevance to enhancing the capacity of poor societies to reorganize and improve

controlling growth while, at the same time, steer attention away from the difficult politics that result from differentiated social groups and nations having different interests in causing and alleviating environmental degradation. People know that there is a Population problem, in part because they act as if we are unitary and not many differentiated "we's". (As mentioned in the introduction, one could analyze the constructions of population control that are more purely technocratic, but we have chosen to concentrate on the combined moral-technocratic dimensions of neo-Mathusianism, considering this interpretation to have more relevance to environmentalists.)

3) With respect to the localized social and economic dynamics, involving population change will ensure that scientists, environmentalists, and policy makers are continually surprised by unintended outcomes, unpredicted conflicts, and unlikely coalitions.

4) To the extent that people attempt to focus on overpopulation, to stand above such coalitions and the conduct of such conflicts, and to discount their responsibility for the unintended outcomes, they are more likely to facilitate increasingly coercive responses to environmental degradation.

Let us begin our exploration of these propositions with a simple scenario. Consider two hypothetical countries having the same amount and quality of arable land, the same population size, the same level of technical capacity, and the same population growth rate, say 3% per year. Country A, however, has a relatively equal land distribution, while country B has a typical 1970's Central American land distribution: 2% of the people own 60% of the land; 70% own just 2%. Following through the calculations it turns out that five generations before anyone is malnourished in country A, all of the poorest 70% in country B already are. But this is not just an issue of relative timing of the Population problem in the two countries. The likely level at which B's poor would first experience what others call Population pressure would be food shortages linked to inequity in land distribution (see Durham, 1979; Vandermeer, 1977). Anyone promoting population control policies on the basis of the aggregate population growth rates could easily be viewed by the poor as taking sides with those who benefit from the inequitable access to productive resources.

The scenario is too simple to constitute a sufficient description of the social dynamics of regions in which people contribute differentially to environmental problems. (See the previous section for discussion of the conditions that influence what the poor would be able to do with a politicized analysis of their crisis.) The story does, however, indicate the political dimension of any demographic analysis that is separated from the differentiated social dynamics. Of course, everyone knows that there are rich and poor, that the rich consume more per capita, and that the poor may be compelled by their poverty to "mine" their resources. Acknowledging inequality does not, however, constitute an analysis of the dynamics of inequality, and so in the absence of serious intellec-

tual work —conceptual and empirical— the heartfelt caveats about the rich and the poor do not substantially alter the politics woven into the Population framework.

We want to describe the politics of neo-Malthusian discourse as a moral-technocratic alliance. The moral signifies that everyone must change (reduce their family size) to avert catastrophe. Coercion is rejected; each individual must make the change needed to preserve the environment. Technocratic, on the other hand, signifies that objective analyses (of population growth) identify the severity of the crisis and technical measures (e.g., contraception and sterilization) are developed and provided (with the appropriate policy stimuli) for individuals and countries to adopt. There is little tension, however, between voluntary individual responses and the managerial-technical ones. They are alike in attempting to bypass the political terrain in which different groups experience problems differently and act accordingly. They appeal to common, undifferentiated interests as a corrective to corrupt, self-serving, naive and/or scientifically ignorant governance. Moreover, like all appeals to universal interests, special places are implicitly built into the proposed social transformations —the scientist as analyst/policy advisor; the moralist as guide/enlightened leader (Taylor, 1988; Taylor and Buttel, 1992). *In fact, in the absence of any analysis of differentiated interests, Population discourse logically offers no other standpoints for an environmentalist to take.*

We have been making a conceptual argument that the privileging of moral-technocratic responses is a consequence of the aggregate categories, the technical problems of contraceptive delivery, etc., that constitute Population discourse. We can also confirm this argument empirically by observing the language of management and moral recruitment permeating that discourse. (We do not want, however, the reader to forget the conceptual argument and then, by claiming that the authors we quote are extreme or idiosyncratic, discount our whole interpretation.) Consider, for example, some of the recent discussion papers circulated to develop Pugwash's initiative towards a "sustainable, equitable and livable future".⁶ Displaying the hubris of technocrats, one author wants to "*rechannel* activity into sustainable forms" and another calls for "a total picture of the world". At the same time the recurrent use of "we", "our culture" "our existence", and phrases such as "*our* built-in limitations of perception", "time available for *us* to change *our* ways" point to "our" common prospect. Similarly, evolutionary biological discussion —whatever character being addressed— makes us all alike as members of the human species. (The idea that it is human nature to consume —the affluent do so, while the poor aspire to— is central to the discounting of labour as a productive and creative force; see previous sections.) Individual behavior and social dynamics are expressed in the same undifferentiated terms, with no mention of any structure between the individual and society and with individual metaphors used for social ideas: Does

society have the "*will* to alleviate poverty?" one person asks. "Affluent societies can choose", he claims, despite the "perennial foot-dragging of the establishment". "Individuals vary [therefore] societies vary", another author asserts. And the special place for these analysts is implied when they prescribe education to effect change: they understand the problems; others must be taught the right behavior for the problem to be alleviated.

It should be clear that we oppose neo-Malthusian Population discourse, considering its science to be conceptually inadequate and empirically superficial and wanting in its assertion that there is a need for differentiated politics. Nevertheless, we recognize that there are many practical reasons for a scientist to contribute to the moral-technocratic approach. For example, moral recruitment and appeals to universal interests can be as effective as political tactics human rights campaigns in times of severe political repression demonstrate that. More generally, political mobilization usually depends on stressing commonality of interests and discounting differences. And a technocratic outlook is not a ridiculous orientation for scientists who would rather apply their special skills as best as they can to benefit society, than to expend energy in political organizing for which they have little experience or aptitude. The interpretation of this section cannot, on its own, undermine such practical facilitations. We have merely argued that moral-technocratic politics and the science that facilitates them are not given by nature. Instead, scientists and other social agents choose to contribute to such science-politics and are thus partly and jointly responsible for their consequences.

In order to urge neo-Malthusians to acknowledge that responsibility we want to stress that it does have consequences. For example, in the early 1980's in Chiapas in southern Mexico, villagers became angry when they discovered that internationally funded health workers were sterilizing women after childbirth without their consent. The villagers killed two of these workers, only to have the government call in the military to raze the village in retaliation. This may be an extreme case, but it is not "unfortunate". The Population problem translates readily into medical and clinical measures to reduce birth rates. The lack of analysis of particular social and economic dynamics reduces the chance that resistance would be anticipated, understood or tolerated by the international agency and the government. And the general outlook that institutions in poor societies are generally weak and corrupt ensures that the heavy handed action by some states, yet not by others, is inexplicable. Moreover, the Chiapas event is not an isolated case. In India during the 1960's and 70's, especially during the Emergency of 1975/76, population programs resulted in injuries and deaths (see Blaikie, 1985, p. 98 for discussion and references). Resistance and revolt linked democratic aspirations and opposition to family control programs, surely an unfortunate coalition in the eyes of most Western environmentalists.

Over the last generation Population growth has declined in many countries,

and, in some cases, statistically significant effects of Population control programs have been discovered. Yet, the successful programs have piggy-backed upon other social changes favouring reductions in birthrates, such as employment of women in the formal work force, reductions in infant and child mortality, increased value of educating children at the same time as its incurring a cost to the family, and so on (Blaikie, 1985, p. 100). Analysis of the differentiated social and economic dynamics of particular situations would not only help explain the occasional successes, but also to plan the broader family welfare programs needed to accompany birth control programs and to anticipate the ways that the broader measures, such as adult literacy campaigns or the development of appropriate technology, can be undermined by the dynamics of labour scarcity or by those whose interests are threatened in some way. For these reasons alone, one might abandon the Population problem as a framework for analysis and action. Yet the violent and coercive dimensions of the Chiapas and the programs in India of the 1960's and 70's invite us to examine more carefully any tendencies to coercion or violence inherent in the Population framework.

The moral posture of most environmentalists —lifeboat ethicists (Hardin, 1972) and certain bio-centric deep ecologists (see Bradford, 198) aside— is to support sustainable, livable and equitable futures for all, free from economic and political coercion. The Population framework, however, works against this professed commitment in many ways:⁷ 1) Undifferentiated categories, such as population, affluent societies, and human nature, facilitate, as we have described, moral-technocratic discourse that provides little purchase in explaining the outcome of population control programs or generating successful ones. 2) The lack of analysis of the interrelations among population, social organization, technological change and the environment makes any analysis of the interrelation between the affluent and poor difficult, and, at best, holistic and simplistic. This, in turn, facilitates the abstraction of considering the poor and the affluent separately, in fact, as essentially different types in their institutions, consciousness and social possibilities. 3) The essential conception of affluent and poor people (McLaughlin, 1990) permits a simplistic analysis of the possibilities of productive and creative institutional response in societies that may be classified as, on average, affluent or poor. Furthermore, it reinforces the moral authority to educate or otherwise intervene that accrues to the affluent by virtue of their potential, through education and capable political and technical institutions, to respond to environmental problems. 4) Several factors combine to make the discourse and practice of Population control susceptible to shifting into a coercive posture: frustration in the face of failed Population control programs, the urgency of the environmentalists' crisis rhetoric, the lack of any differentiated categories and intermediate standpoint between the individual and society, the essential contrast between capable and fair institutions in affluent societies and weak and corrupt in poor societies, and the moral authority to

intervene. In fact, what options other than inaction or coercion are available? Nancy Peluso's recent analysis of the coercive dimensions of internationally endorsed conservation schemes, such as wildlife reserves in Kenya and forest conservation in Indonesia, indicates that this is not just an abstract possibility (Peluso, 1992). Many conservation schemes require or assume state control over natural resources, whereas this is often resisted by local peoples who have been gaining some of their livelihood from the resources in question —elephant tusks, game, products from the forests, and so on. Conservation schemes have thus given the state and militarized institutions opportunities to gain more control of territory and peoples under a benevolent banner.

5) A different path to coercion derives, ironically from the endorsement by various steady state advocates of the market as a means to protect and promote individual freedom. Contrary to the ideology that market relations are a natural form of interaction among individuals, real markets always have to be constructed and the motivation to construct them generally depends on institutional arrangements that ensure the possibility of accumulation. Deregulation and dismantling of the centralized state enhance the power of corporations to dictate more freely the terms of their exchanges. As Simon Marginson (1988) observed, only capital, not people, is set free by the free market. Given the enhanced freedom of corporations after a decade of deregulation to decide the form and location of their investments, environmentalists must make tactical alliances with capital to achieve any of their aims. That is, they must accede to the power of corporations to control labour and other resources, preferably not in the environmentalists' backyard, but, somewhere else.

We hope to have demonstrated that there are many reasons to break open neo-Malthusian discourse into a social analysis of environmental change. The emphasis on social organization as intervening between population change and resource use makes environmental studies more complex. There are favored courses of social action woven into all science so the question we leave which concerned scientists and environmentalists is, which standpoint will you take for research and action? Will the principles of non-coercion and anti-violence lead Pugwashites to reject moral-technocratic discourse, to dig deeper than the conventional analyses, which —in their structure if not always explicitly— hold poor populations to be the most important drag for the construction of a sustainable world, and to resist any repressive measures in the name of sustainability? Which direction will be taken by Pugwash in the complex politics of local and global resource management and environmental protection?

NOTES

¹ For reviews see Richards 1983, Watts 1983, Taylor and García-Barrios 1992.

² Although the description to follow is necessarily a generalization, we invite readers who feel strongly misrepresented by it to consider their implied positions, not just their literal statements (or lack thereof) on the issues covered in the generalized description. Moreover, we have omitted some qualifiers, such as, "enough members of affluent populations can imagine..." for simplicity of prose and because the existence of the other, non-enlightened members does not change the structure of this discourse. Finally, because we want to maintain a high level of generalization, this essay does not refer explicitly to any author or institution as a *direct representative of their ideas*. Nevertheless, examples of the discourse that supports our interpretation may be easily found in the existing literature. Refer, for example, to the opening essay by William C. Clark, pgs. 48 and 53, in the special issue of *Scientific American*, September, 1989. In the same issue, see also the articles by Nathan Keyfitz and Maurits la Riviere. See also Clark & Holling 1975. At the level of economic and social practice, consider the most recent policies of the World Bank toward the Third World countries.

³ Rent seeking is an economic term for an agent's organized actions aimed at getting the State to provide the agent with a disproportionate share of, or access to the State's resources.

⁴ Ehrlich and Holdren formulated their neo-Malthusian position in 1971 explicitly in terms of a mathematical equation, $I = P \cdot F$, where I is the negative impact of population, P is the population size and F is a function denoting the per capita impact. Ehrlich being a population biologist it is relevant to observe that population biology has, in recent years, begun to pay attention to the qualitative differences in predictions based on models that distinguish individuals within a population (in terms of their spatial location or other characteristics) when compared with the older style of using aggregate variables to describe a population (insert refs).

⁵ Western emphasis on the local knowledge of indigenous peoples (e.g., Toledo, 1992), ironically, places an additional burden on their shoulders, by shifting the locus of resistance to environmentally destructive development to their societies and away from industrialized societies in which Westerners have not organized themselves well enough to resist effectively.

⁶ We refer to documents received before July 10, 1992. We are still digesting papers and revised versions received after that date.

⁷ Ironically, many neo-Malthusians reinforce their appeal for population control on the grounds that without it coercive measures will surely be taken when the Population problem becomes more severe (see Ehrlich and Holdren, 1971).

BIBLIOGRAPHY

- Bardhan, P. K., 1984, *Land, Labor and Rural Poverty: Essays in Development Economics*, New York, Columbia University Press.
- Bartra, A., 1979, *La explotación del trabajo campesino por el capital*, Mexico, Macehual.
- Bhaduri, A., 1983, *The Economic Structure of Backward Agriculture*, Academic Press.
- Binswanger, H. and M. Rosenzweig, 1986, "Behavioral and Material Determinants of Production Relations in Agriculture", *Journal of Development Studies* 22, pp. 503-539.
- P. Blaikie, 1985, *The Political Economy of Soil Erosion in Developing Countries*, London, Longman.
- Boserup, E., 1965, *The Conditions of Agricultural Growth: the Economics of Agrarian Change under Population Pressure*, London, Allen and Unwin.
- G. Bradford, "How Deep is Deep Ecology: A Challenge to Radical Environmentalism", *Fifth Estate*.
- Brandt, W. (ed.), 1983, "North-South: A Program for Survival", *The Second Report of the Independent Commission on International Development Issues*, London and Sydney, Pan Books.

- Clark, W. C. and C. S. Hulling, 1985, "Sustainable Development of the Biosphere: Human Activities and Global Change", in T. F. Malone and J. G. Roederer (eds.), *Global change*, Cambridge, Cambridge University Press, pp. 474-490.
- Clark, W. C., 1989, "Managing Planet Earth", *Scientific American* 261(3), p. 54.
- Collins, Jane L., 1987, "Labor Scarcity and Ecological Change", in Peter D. Little, Michael M. Horowitz, and A. Endre Nyerges (eds.), *Lands at Risk in the Third World: Local Level Perspectives*, Boulder, Westview, pp. 19-37.
- Collins, R. and S. Restive, 1983, "Development, Diversity, and Conflict in the Sociology of Science", *Sociological Quarterly* 24, (1983), pp. 185-200.
- Cornia G. A., R. Jolly and F. Stewart, 1987, *Ajuste con rostro humano: protección de los grupos vulnerables y promoción del crecimiento, Siglo XXI*, España.
- Daly, H., 1991, *Steadystate economics*, Island Press.
- De Janvry, A. and R. García-Barrios, 1988, "Rural Poverty and Environmental Degradation in Latin America: Causes, Effects, and Alternative Solutions", Paper presented at the International Consultation on Environment, Sustainable Development, and the Role of Small Farmers, Rome, International Fund for Agricultural Development, October 11-13.
- De Janvry, A., E. Sadoulet and L. Wilcox, 1986, *Rural Labour in Latin America*, World Employment Programme (WEP), Research working paper No. 79.
- Downing, T. E., S. B. Hecht, H. A. Pearson and C. García-Downing, 1992, *Development or Destruction? The Conversion of Tropical Forest to Pasture in Latin America*, Boulder, Westview Press.
- Durham, W., 1979, *Scarcity and survival in Central America: Ecological Origins of the Soccer War*, Stanford, Stanford University Press.
- Ehrlich, P. R., Ehrlich, A. H. and J. P. Holdren, 1977, *Ecoscience: Population, Resources, Environment*, San Francisco, W. H. Freeman.
- Ehrlich, P. and J. Holdren, 1971, "Impact of Population Growth", *Science*, March 26.
- Feder, E., 1980, "The Odious Competition Between Man and Animal Over Agricultural Resources in the Underdeveloped Countries", *Review* 3(3), pp. 463-500.
- García-Barrios, R. and García-Barrios, L., 1990, "Environmental and Technological Degradation in Peasant Agriculture: A Consequence of Development in Mexico", *World Development*.
- García-Barrios, R., L. García-Barrios and E. Álvarez-Buylla, 1991, *Lagunas: Deterioro ambiental y tecnológico en el campo semiproletariado*, Mexico, El Colegio de México.
- Hardin, G., 1968, "The Tragedy of the Commons", *Science* 162, pp. 1243-1248.
- , 1972, *Exploring New Ethics for Survival*, New York, Viking Press.
- Hartwick, J. and N. D. Olewiler, 1986, *The Economics of Natural Resource Use*, Harper and Row.
- Harvey, D., 1974, "Population, Resources and the Ideology of Science", *Econ. Geog.* 50, pp. 256-277.
- Hotelling, H., 1931, "The Economics of Exhaustible Resources", *Journal of Political Economy* 39, pp. 137-175.
- Keyfitz, N., 1989, "The Growing Rural Population", *Scientific American* 261(3), pp. 118-126.
- Lewis, A., 1954, "Development with Unlimited Supply of Labour", *The Manchester School* 22, pp. 139-192.
- Little, P., 1987, "Land Use Conflicts in the Agricultural/Pastoral Borderlands: The Case of Kenya", in P. Little, M. Horowitz, and A. Nyerges (eds.), *Lands at Risk in the Third World: Local Level Perspectives*, Boulder, Westview, pp. 195-212.
- Mamdani, M., 1972, *The Myth of Population Control*, New York, Monthly Review Press.
- Marginson, S., 1988, "The Economically Rational Individual", *Arena* 84, pp. 105-114.
- Maurits la Riviere, J. W., 1989, "Threats to the World's Water", *Scientific American* 261(3), pp. 80-94.
- Max-Neef, M., 1986, *Desarrollo a escala humana: una opción para el futuro*, CEPAUR/Fundación Dag Hammarskjöld.

- McLaughlin, P., 1990, "Obstacles to a New Sociology of Agriculture: The Persistence of Essentialism", Cornell University Department of Rural Sociology (manuscript).
- Meadows, D. H. *et al.*, 1972, *The Limits to Growth*, New York, Universe Books.
- Mehler, B., 1989, *History of the American Eugenics Society*, Ph. D. Thesis, University of Illinois, Champaign-Urbana.
- Norgaard, R. N., 1991, *Sustainability as Intergenerational Equity: The Challenge to Economic Thought and Practice*, The World Bank, Asia Regional Series IDP 97.
- Peluso, Nancy, 1992, "Coercing Conservation: The Politics of State Resource Control" (manuscript).
- Polanyi, K., 1975, *The Great Transformation*, New York, Octagon Books.
- Richards, Paul, 1983, "Ecological Change and the Politics of Land Use", *African Studies Review* 26, pp. 1-72.
- Ruttan, V. and Y. Hayami, 1984, "Towards a Theory of Induced Institutional Innovation", *Journal of Development Studies* 20, pp. 203-23.
- Star, S., 1988, "Introduction: The Sociology of Science and Technology", *Social Problems* 35, pp. 197-205.
- Taylor, P. J., 1988, "Technocratic Optimism, H. T. Odum and the Partial Transformation of Ecological Metaphor after World War 2", *Journal of the History of Biology* 21, pp. 213-244.
- , 1989, "Revising Models and Generating Theory", *Oikos* 54, pp. 121-126.
- , 1992, "Re/constructing Socio-ecologies: System Dynamics Modeling of Nomadic Pastoralists in sub-Saharan Africa", in A. Clarke and J. Fujimura (eds.), *The Right Tool for the Job: At Work in the Twentieth Century Life Sciences*, Princeton, Princeton University Press.
- Taylor, P. J. and F. Buttel, 1992, "How Do We Know We Have Global Environmental Problems: Science and the Globalization of Environmental Discourse", *Geoforum* (in press).
- Taylor, P. J. and R. García-Barrios, 1992, "Anthropology and the Social Analysis of Environmental Change" (manuscript).
- Toledo, V., 1992, "El cauce antropológico y la metamorfosis de la ecología", *Antropológicas* 3, pp. 57
- Turner II, B. L., 1990, *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere Over the Past 300 Years*, Cambridge University Press.
- Vandermeer, J., 1977, "Ecological determinism" in Ann Arbor Science for the People (ed.), *Biology as a Social Weapon*, Minneapolis, Burgess Publishing Co., pp. 108-122.
- Watts, M., 1983, "On the Poverty of Theory: Natural Hazards Research Context", in K. Hewitt (ed.), *Interpretations of Calamity from the Viewpoint of Human Ecology*, Boston, Allen and Unwin, pp. 231-262.

CONTENTS

Introduction	5
1. The Social Dynamics of Population and Environmental Degradation .	9
2. Moral-Technocratic Environmental Discourse	24