SUSTAINABLE DEVELOPMENT – A Conceptual Overview

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Introduction

Sustainable development is a widely used international banner word. It entered the vocabulary of environmentally oriented international agencies in the early seventies and steadily rose to its current eminence through a series of interventions in the form of conferences and global reports (1). With the publication in 1987 of "Our Common Future", the report of the World Commission on Environment and Development (WCED) – better known as the Brundtland report – the international legitimacy enjoyed by the term has been dramatically enhanced. However, the plethora of publications notwithstanding, the career of Sustainable Development as a concept is still in its early stages. It means different things to different people, and it appears that already the term is suffering from overuse and facing the danger of becoming yet another hackneyed phrase.

Sustainable development, as a terminology, suggests the convergence of two major discourses which appear to be antagonistic to each other, the environmental and development discourses. As we approach the end of the eighties, it would seem that these two independent discourses have receded into the background and a third discourse is emerging from their interface. The main concern of the new discourse is to bring environment and development into a common focus. The birth of environmental studies and subdisciplines like environmental economics at university levels, and the ongoing debates on sustainable development and ecology in which various mainstream, Marxist, Anarchist, Feminist, and other tendencies participate are clear evidence of an expanding discourse that has the potential of subsuming the two discourses, from whose interface it has emerged, but under a new rubric with a broader set of parameters. These debates while exposing the limitations of the contending paradigms of our time – whether mainstream or radical - have clearly put holism and interdisciplinarity on the agenda of the coming paradigm shifts.

The Two Discourses

The development discourse addressed the complex question of industrial transformation of the underdeveloped world in the postwar period. Its most dominant school, represented by the modernisation paradigm, saw the development of the South essentially as a replay of the processes of capitalist industrialisation of the North. This paradigm was attacked by various Marxist and neo-Marxist schools which offered alternative interpretations of the historical processes of underdevelopment, and advocated radical, non-capitalist solutions including versions of Soviet and Chinese type socialism. There were also nationalist, populist tendencies which stood for "indigenous socialism," as against "imported socialism." It can be said that the parameters of the development discourse are essentially political economic.

The environmental discourse was principally concerned with the ecological consequences of industrialisation in the North. The ideological positions ranged from moralistic, and sometimes even mystical, eco-fundamentalism (deep ecology) to 'pragmatic' environmental managerialism. The former is biocentric (as against anthropocentric), anti-growth and anti-industrial. The latter believes in solving environmental problems by internalising environmental costs or externalities into the economic calculus and combating pollution by state intervention. In fact, the latter can be seen as a response from mainstream economists to environmentalist critiques. Furthermore, various environmentalist and ecological schools, by virtue of their critical stands on the 'technological society' and its growth fundamentalism, and 'existing socialism', were actually paving the way for an active interface between the two discourses by challenging the various schools of development.

While the modernisation and the radical (Marxist and neo-Marxist) schools were irreconcilably antagonistic to each other on the meaning and modes of development, they appeared to share a common premise as regards nature which was seen by all of them as merely a store of resources for development. The radicals offered a more interdisciplinary interpretation of underdevelopment, and posed the question of development in terms of social transformation for a more just order. They highlighted the predominance of natural resources and agricultural exports, and the stagnation of productive forces, in the Third World. However, they failed to extend their analysis to environmental degradation and its consequences.

A major intellectual impetus for the expansion of the interface was provided by studies on resource degradation, causes and consequences of drought, and famines in the less developed countries. These interventions have helped broaden the arena of the environmental discourse and redefine the environmental problematique in Third World terms by squarely placing the question of sustainability, alongside other major questions like growth, equity, and structural transformation, at the centre of current debates on development. The terrian of the debates on sustainable development can aptly be described as eco-political-economic.

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Sustainable Development - Eco-Political Economic Ideas from the Interface

Views emanating from the interface of the environment-development discourses have helped clarify the complex role of nature in development. If development meant material and cultural wellbeing through progressive structural changes toward a more dynamic, equitable and just social order, then the development process cannot be seen in isolation from the environment. The development process unfolds on a people-people-nature continuum. People enter into definite relations between each other and with nature under given political economic and cultural conditions, which define and provide the mediating institutions for these relations.

First of all, appropriation of nature in an absolute precondition for human existence and reproduction. The continuous extraction of

energy and matter from nature and their conversion into goods and services, and the transformation of nature into instruments of production as well as sites for human habitation, are manifested in spatial structures that become part and parcel of the cultural landscape. Nature has always been subject to continuous alterations and transformations, and the environment can be seen as a dynamic entity socially-though not always fully consciously - constructed, deconstructed and reconstructed on a biophysical foundation. This process involves institutionalisation of control over resources in the form of property rights.

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However, privatisation and commodification of nature as land and natural resources in the industrial age, and the simple equation of growth with development, have externalised most of the functions of the biophysical environment, (which are so indispensable for human existence and progress), from the development process. Though this alienation is most advanced in the realm of the economy, its social and cultural effects are pronounced too, as evidenced by individuals' alienation from each other and from nature. This historical alienation is consciously and unconsciously reflected in mainstream and alternate development thinking and theorising.

In order to relate development processes to the environment, at least the following vital roles of the environment (or nature in the broad sense) must be recognised:

(a) supply of natural resources.
(b) absorption and recycling of waste generated by production and consumption.
(c) sustaining life through the essential ecological processes and natural life support systems (2).
(d) serving as habitat for the existence, enjoyment , and reproduction of human life.

Such a focus on development-environment relations provides a valid point of departure for concepts of sustainable development (3). However, from there onwards, visions of sustainable development take more explicitly ideological forms. It is also imperative to remind ourselves that development and environment are qualitative categories and that their internal and interactive dynamics can only be partially captured by quantitative measurements and indicators.

The abovementioned roles are contradictory as well as interdependent. Most importantly, it is not possible to divide nature into isolated parts responsible for each role. In a larger sense, it is the same nature that plays all these roles. However, they are subject to a variety of contradictory and often a disjointed institutional mechanisms and adhoc human interventions. The relationships between the different roles change according to political economic and cultural conditions. Therefore, it is important to relate their ecological peculiarities to the social context at local, national and global levels. In general, privatisation and commodification of nature as real estate and production inputs, i.e. a, tend to externalise b, c and d, from the narrow conception of the economic process as a means to accumulate capital and the economic calculus based on it. Excessive waste disposal beyond the environment's capacity to absorb and recycle undermines b, and in turn c and d. Some aspects of d may be privatised and commodified but not all. The essential ecological processes cannot be commodified or artifically produced.

In other words, parts of the processes and ecosystems responsible for them are privatised and commodified, while the majority of them remain external to the formal economic structures of commodity production (4). This alienation or externalisation lies at the root of the narrow conception of the development process. Interestingly, mainstream economic theory (in its environmental economics version) has rediscovered this alienation at the level of manifestation through its recent preoccupation with market failures or externalities.

Both development and underdevelopment have created antagonisms between these interdependent roles. Such antagonisms are also a reflection of the contradiction between the micro rationality of resource exploitation by individuals – whether for profit or for survival – and the collective, long term macro rationality of the society which demands an orgnic, harmonious relation between the society and the environment. They also reflect the breakdown of traditional communal institutions of resource management that ensured the long term sustainability of the resource base – for example pastures, forests and irrigation systems which get converted into open access resources. More importantly, conflicts between micro and macro rationalities are themselves products of historically formed structures within which people engage in extraction, production and exchange.

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Stated simply sustainability is a question of understanding and handling these contradictions and interdependencies without letting them turn into irreconcilable antagonisms. But in the real world these contradictions are most complex and intractable and present major challenges to theoretical analysis as well as policy. The unprecedented growth of the productive forces in the industrial economies, and the stagnation and regression of the same in the less developed economies, within given political economic structures have intensified the contradictions between the different roles to antagonistic levels. The impact of this varies spatially and temporally all over the globe.

The separtion between town and country which began in medieval times, became a distinguishing feature of industrial transformation; after all, modernisation and urbanisation are synonymous. The significance of the modern town-country dichotomy lies in the unprecedented concentration of industrial plants, servicing activities, and populations in urban areas, and in the equally unprecedented industrialisation of agriculture and de population of the countryside. Urbanisation has concentrated environment polluting processing, transport and consumption activities in relatively small geographical areas. On the other hand the industrialisation of agriculture and its subordination to urban demands have had far reaching environmental effects.

The large scale transport of plant matter in various forms – as food and raw materials – from the countryside to urban centres involves the removal of plant nutrients absorbed by crops from the soil. There are also disruptions caused to naturally provided environmental services. The loss of nutrients from soil may be made good by artificial supplies of fertilizers, but the disruptions of other processes which do not affect agriculture in the short run are not taken into account.

On the global level, the dominant tendency is the constant conversion of nature, piecemeal, into elements of fixed and circulating capital for purposes of expanded reproduction of capital. This process, which may be called capitalisation of nature (O'Connor 1989), continuously generates irreversible changes in the biophysical environment. Another process, which cannot be seen in isolation from this, is the degradation of naure by millions of poor in their struggle for survival.

Obviously, it is not possible to uderstand the relations between the roles played by nature and the development process without locating them in their political economic-cultural-spatial contexts. Any interpretation of these relations has its ideological underpinnings. Since any view of sustainable development has to address these relations, it cannot escape politics and ideology. This is one of the causes of the prevailing plurality in the meaning of sustainable development. For instance, a particular view of sustainable development

may focus on one or few elements in the complex totality involving class, ethnicity, gender, kinship, community, technology and nature. Some of the other causes come from the scientific disciplines informing particular view of sustainability. There are also variations depending on, whether one is dealing at the global, national, or subnational level, with developed or less developed countries, temperate or tropical conditions. They also depend on the sector addressed – for example agriculture, forestry, wildlife, fishery, industry etc.

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As a starting point, we may take the definition of sustainable development offered by the WCED:

"In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations." (WCED p 46)

Now, this is a broad and open ended definition which may be elaborated on or criticised from different ideological positions (although, incidentally, the Commission's own position may be called social democratic). One may visualise several ideological positions on a spectrum between two extremes which may be called radical ecological and status quoist.

Radical visions of a new, ecologically conscious, society have been articulated by eco-socialists (ecc-marxists), eco-anarchists and feminists who reject capitalist as well as existing socialist modes of development. One of the better known eco-socialists writes: "the ecological perspective is incompatible with the rationality of capitalism. It is also wholly incompatible with the authoritarian socialism which (whether it relies on central economic planning or not) is the only kind which exists in the world today on a governmental level ." (Gorz 1980 p 18). The new radicals also argue that any economic system or technology that dominates nature is a tool of domination over people too. Each radical school projects its own eco-utopia, and there are fundamental differences between eco-socialists and eco-anarchists. Even among the eco-socialists, a clearly worked out problematique – let alone a consensus on the meaning of eco-socialism - has yet to emerge. I shall, however, hazard a listing of the main points around which the eco-socialist visions of the future may develop.

– a radical restructuring of the social relations and the conditions of production, distribution, and the relation between society and nature, with the view to de-commodify the economy and end all forms of alienation and gender and racial inequalities;

– adoption of alternate structures of growth and accumulation that are resistant to, or free of, cyclical crises that characterise capitalism, and are based on communitarian self-management and technologies chosen according to social and ecological criteria;

– the restructuring of the economy and society is based on new social geographies that lead to a progressive elimination of the modern town-country dichotomy;

– a concern with the well-being of future generations, i.e. inter generational equity.

There are also overlaps between eco-socialists and eco-anarchists in their conceptions of the future relations between humans and nature. The radical ecology of Gorz – who has been referred to above as an eco-socialist – has a lot in common with that of the eco-anarchist Bookchin on the subject of the liberated individual (see Mellos 1988 for a detailed theoretical treatment of this point). The environmental crisis has provided the eco-anarchists with some new ammunition to reinforce their traditional critiques of capitalism and existing socialism. Rejecting both systems, they reiterate their case for anti-authoritarian / non-authoritarian eco-communities and eco-technologies based on voluntary affinities in a stateless, ecological society. Denouncing the objectification of nature, the anarchists stand for nature as subject, as the human individual's collaborator in his/her emancipation from all form of authority. Bookchin, the well known eco-anarchist has this vision of an "ecotopia':

"The antagonistic division between sexes and age-groups, town and country, administration and community, mind and body would be reconciled and harmonized in a more humanistic and ecological synthesis. Out of this transcendence would emerge a new relationship between humanity and the natural world in which society itself would be conceived as an ecosystem based on unity in diversity, spontaneity, and non-hierarchical relationships." (Bookchin 1980 p 69)

The status quoist views of sustainable development are premised on accepting the existing political economic order, capitalist or socialist, and working out strategies to contain and manage natural resource use and environmental problems. The instruments available for this are law, taxation, market regulation, planning and technological change within the system. It is a 'piecemeal engineering' approach based on a philosophy which sees sustainable development as,

"a process of solving a succession of problems which from time to time threaten the productive system and the sufficiency of our subsistence. In effect, human societies out of ecological equilibrium have to run to keep up; their development does not necessarily imply any long term improvement in the quality of human life." (Wilkinson 1973 p 105).

Several new tendencies can be located between these positions on a wide ideological spectrum. There are social movements in the Third World which address environmental problems as part of the struggle for self-determination of tribal communities against 'intruding' land users who destroy forests and grazing lands. In the less developed countries many problems with serious environmental implications are also problems of basic economic needs and social security. As a result they are articulated in explicitly economic and political terms with the environmental dimensions being left implicit. However, there is a growing awareness among scholars and activists in the Third World about the links between environmental degradation, export of natural resources, oppressive national regimes and international capital. Radical environmental movements in South Asia, which have launched sustained campaigns against large dams and river diversion schemes, advocate "people-centred sustainable development'. In a recent work, the Indian feminist and environmentalist Vandana Shiva attacks the post-colonial development models as a new project of western patriarchy and advocates an alternative vision of the organic unity of people and nature and the restoration of the 'feminine principle' (5). Ecological visions also inform ideologies of social movements fighting for a new, humane civil society and decentralised governanace. There is also growing advocacy in favour of utilising local knowledge about environment and production systems in designing sustainable development strategies.

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Nonetheless, there appears to be some common elements across most of these positions

on certain values which may be stated as follows: Any mode of sustainable development should,

– ensure continuous improvements in overall economic, social and cultural well-being with progressive equitability through generations,

– take account of all possible environmental effects of resource consuming activities, distinguish between reversible and irreversible effects, minimise activities causing irreversible effects while internalising the costs of all effects, and be conscious of the energy economy of production and consumption activities,

– rely more on sustainable utilisation of renewable resources and use exhaustible resources sparingly,

– recognise that ecological processes and effects do not respect politically and administratively determined boundaries between and within nations, and

– help maintain essential ecological processes and preserve genetic diversity.

There is a consensus that these requirements cannot be taken care, of even to minimal levels, without major state interventions and fundamental changes in the systems of national accounting in a market economy. One may, however, hasten to add that it is not only the free market forces but also certain types of state interventions that promote unsustainable resource exploitation and environmental damage. State intervention has always been a part of capitalist development and crisis management. However, with the advent of the sustainability question, the contradictory roles of the state with reference to environment-development relations have become even more evident. These contradictions are generated by three different types of state interventions:

– those aimed at promoting private investment and accumulation; these include public investment in infrastructure and special incentives in favour of particular economic activities,

– those meant for the mediation of class and other social conflicts via social welfare; and,

– those in response to environmentalist demands by placing restrictions on certain economic activities and enforcing environmental legislation.

In the first role, the state may be actively aiding and abetting capital in degrading the environment. In the second, it seeks to strengthen the legitimacy of the social order and ensure its continuity by providing the conditions for the smoother reproduction of labour power and maintenance of social harmony (O'Connor 1973, Gough 1979). The third role - which places limits on growth and accumulation - contradicts the first and contradicts as well as complements the second. Enforcement of environmental standards creates, at least in the short run, new barriers to accumulation (O'Connor 1989). It may also limit employment and income generation while making consumers pay more taxes, which may affect the current levels of consumption.

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Status quoist and reformist approaches to sustainable development are aimed at handling these contradictory roles of the state with the aid of policy instruments. It is conceivable that in the long run the contradictions may sharpen into a serious crisis that cannot be contained by piecemeal engineering. Radical schools of sustainable development may pin their hopes for fundamental changes on the political prospects offered by such crises.

In theory it should be possible to satisfy the requirements for sustainable development to a very high degree in a planned economy. But, experiences of existing socialism show the case to be otherwise. The planned economies have their own share of environmental problems. This state of affairs is not unrelated to their history of socialist development planning which disregarded environmental problems and considerations just like the capitalist economies. Planning in existing socialism was largely based on permises derived from the historical experiences of capitalist industrialisation. The socialist conceptualisation of the growth and accumulation processes and intersectoral relations had capitalism as its frame of reference. It was assumed that once private property and the market forces were replaced by state and collective property and central planning, the productive forces of capitalism could be adopted to the best advantage of the society. One of the many consequences of this mechanistic conception was the neglect of the environmental dimension.

Critique of the Conventional Concept and Measures of Growth

One of the achievements of the debate on sustainable development is the birth of a new consensus on the necessity and feasibility of growth redefined in broadly qualitative terms with reference to the sustainability considerations referred to earlier. This marks a break with the ideology of 'doomsdayism' and zero-growth of the sixties and seventies, as well as a phase of attempted syntheses of the environment vs. growth debates. The significance of this consensus - which is most explicitly stated in the report of the WCED - for the developing countries is only too obvious. However, the question of qualitative and quantitative assessments of growth has raised a host of conceptual issues.

In the first place, the new consensus is based on critiques of the existing concept and measures of growth.

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The number of mainstream economists acknowledging the shortcomings of the concept of GNP and the national accounting systems on which its quantification depends has been growing (Goodland and Ledec 1987, Collard, Pearce, and Ulph 1988). This is a response to political economic and ecological criticisms of the inadequacies of GNP-based views of economic change, development and resource use. It was recognised long ago that GNP per capita did not reveal anything about distribution (6). It is now widely known that, since GNP measures only market transactions, it does not capture unmarketed household production and the transactions in the urban and rural informal sectors which constitute a significant share of the national economy of a less developed country (Redclift 1987).

The concept of GNP as an economic category is even more fundamentally flawed when ecological implications of economic activities are taken into consideration. Being based on market values of goods and services, GNP does not reflect the negative short and long-term consequences of natural resource depletion. For example, national accounts may record the monetary revenue from a tropical rainforest harvested to total depletion as a benefit without accounting for the deleterious effects of deforestation on other production activities and the environment, and the fact that it has caused a loss to the nation's resource stock including genetic diversity. Thus, what may be considered costs from a social-ecological point of view are subsumed under benefit by the existing accounting system. Inherent in this shortcoming is the lack of any distinction between renewable and exhaustible resources, reversible and non-reversible ecological effects, and biologically sustainable and unsustainable rates of depletion of

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renewable resources. "Currently we count present consumption financed by geological and ecological decapitalisation no differently from present consumption financed by sustainable production." (Daly 1988 p 53). With such a system of measuring the economy, notes Henderson, "We have no idea whether we are going forward or backward, or how much of the GNP is social costs and how much of it is useful production that we intended." (Henderson 1981 p 13).

The question of changing the quality of growth is not simply an exercise in valuation and shadow prices but a major project involving creation of alternate structures to replace as well as contain and regulate the market mechanism with the long run aim of complete democratic control of economic processes by the human agency.

Growth as measured in terms of increments in GNP is a 'flow' concept that disregards the biophysical dynamics of the natural resource 'stock' that supplies many of the constituents of the 'flow'. Evidently, in such a conception of growth there is a disjunction between GNP as a 'flow' category and resource base as a 'stock' category. Exposing the inability of the conventional concepts of growth and GNP to separate 'goods' from 'bads', critics have stressed the need for more comprehensive accounting matrices that treat natural resources as a stock or 'ecological capital' that must be managed in sustainable ways. (Henderson 1981, Daly 1988, Leipert 1986).

Criticisms of conventional measures of growth and development have also been raised by various schools of energetics whose point of departure is the laws of thermodynamics (7) (Georgescu-Roegen 1974, Daly 1988). The Second Law, better known as the Entropy Law, is often invoked by some of these critics. Ecology itself went through a paradigm shift after the discovery of the laws of thermodynamics, and energy flows became the key processes to be studied in ecosystems (Worster 1985). Ecologists stress the interaction as well as the distinction between energy and material flows, and the fact that, energy is not recyclable like materials - its flows are unidirectional. In fact, as Odum says "the oneway flow of energy and the circulation of materials are the two great principles or 'laws" of general ecology, since these principles apply equally to all environments and all organisms including man". (Odum 1975 p 61).

Georgescu-Roegen, an economist best known for his work - "The Entropy Law And The Economic Process", calls the second law the "most economic of all physical laws" (Georgescu-Roegen 1974). He argues that the economic process involves irreversible transformations of low entropy into high entropy, and that in the industrial society this is going on at an accelerated pace which threatens the finite store of low entropy in nature. Thermodynamic approaches to economy have led to the energy theory of value which asserts that energy units, instead of monetary units or labour-time, should be the measure of value (Mirowski 1988).

Two basic messages of the Entropy-based views on growth and development seem relevant here. One is the ever widening gap between 'nature's economy' and the modern commodity economy. This has rendered the whole proposition of an energy theory of value impractical. The other is the need to innovate "finer sieves for the sifting of low entropy so as to diminish the proportion of it that inevitably slips into waste" (Georgescu-Roegen 1974, p 294). This may be considered a thermodynamical statement of sustainable development.

In the final analysis all these criticisms, irrespective of their scientific and practical merits and demerits, are criticisms of the political economic order and the prevailing systems of appropriation of nature and production of goods and services. As nature gets converted piecemeal into commodified factors of production, many of its other natural functions vital for human life may get undermined. These functions - the essential ecological processes, for instance-cannot be marketised, unlike the individual elements of nature which are brought and sold. The contradiction between the micro rationality of resource exploitation for private purposes - whether for profit or survival - and the collective macro rationality of the society is most evident here. This contradiction - often stated as the divergence between private and social costs - lies at the root of various environmental campaigns and policies in the developed market economies. Environmental economists address the manifestations of this contradiction as externalities, and are preoccupied with the problem of internalising their effects into the cost-benefit calculus. Eco-socialist critics would maintain that such a fundamental contradiction, and the general vulnerability of the capitalist economy to crisis, cannot be resolved without new forms of socialist planning, while eco-anarchists would advocate communitarian self management (Gorz 1980, O'Connor 1989, Bookchin 1986).

Changing the Quality of Growth

The question of changing the quality of growth is not synonymous with that of changing the accounting systems. It is not simply an exercise in valuation and shadow prices but major involving creation of alternate structures to replace as well as contain and regulate the market mechanism with the long run aim of complete democratic control of economic processes by the human agency. Inevitably, such an undertaking has to evolve new property rights, and systems of appropriation of nature and production of goods and services, with the view to eliminate the antagonisms between micro and macro rationalities of resource use. In light of the emerging consensus on environment and development, changing the quality of growth implies making it an organically integral part of a broader process of development. in other wrods, it is a structural question that belongs to the larger problematique of sustainable development as social change. From such a viewpoint, it calls for a reordering of developing priorities and the creation of appropriate institutional mechanisms to perform four interdependent sets of functions:

– stimulate and direct the growth and accumulation process along ecologically sustainable paths of energy and material consumption,

– create internal structures that minimise vulnerability of the economy to crises and recessions,

– evolve structures from below to satisfy the participatory, distributive, and egalitarian objectives of development, and,

– harmonise the different roles of nature that sustain human society and provide aesthetic joy.

The institutional mechanisms themselves have to be seen as endogenous variants responding to changing needs of the four sets of functions in dynamic local, national and international contexts. Another important variable is technology. Thus sustainable growth requires a political economic environment which facilitates continuous institutional and technological innovations in a planned manner. This takes us back to the ideological question of political economic systems. It is beyond the scope of the present paper to pursue this question at an exhaustively theoretical level.

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NOTES

1. To mention a few major documents: Global 2000 Report to the President (3 vols.); World Conservation Strategy, IUCN-UNEP-WWF, 1980; Conservation With Equity - Strategies for Sustainable Development, edited by Jacobs

and Munro, IUCN 1987; Report of the World Commission on Environment and Development 1987.

2. The essential ecological processes include regeneration and conservation of soil, recycling of nutrients and the cleansing of waters. they are essential for food production, health and other aspects of human existence and are intimately linked to the life support systems (IUCN-UNEP-WWF 1980). The naturally provided life support systems are solar powered ecosystems such as open oceans, major lakes, natural forests, natural grasslands and tidal estuaries. In addition, there are the human subsidised solar powered ecosystems which produce food and fibre with energy support from auxiliary sources like fuel. (odum 1975)

3. This way of defining the roles of nature can be attacked by eco-fundamentalists as anthropocentric and instrumentalist. While admitting this charge, I should hasten to add that I do not subscribe to any techno-fundamentalist cornucoplanism.

4. The commodification of parts of nature (eg. land) in their particular role as factors of production, as Karl Polanyi has described, is fictitious and "was perhaps the weirdest of all undertaking of our ancestors. ... The proposition is as utopian in respect to land as in respect to labor. The economic function is but one of many vital functions of land. It invests man's life with stability; it is the site of his habitation; it is a condition of his physical safety; it is the landscape and the seasons. We might as well imagine his being borne without hands and feet as carrying on his life without land. And yet to separate land from man and organize society in such a way as to satisfy the requirements of a real-estate market was a vital part of the utopian concept of a market economy". (p 178)

Elaborating further on market-nature relations Polanyi says, "The economic argument could be easily expanded so as to include the conditions of safety and security attached to the integrity of the soil and its resources - such as the vigor and stamina of the population, the abundance of food supplies, the amount and character of defense materials, even the climate of the country which might suffer from the denudation of forests, from erosions and dust bowls, all of which ultimately, depend upon the factor of land, yet none of which respond to the supply-and-demand mechanisms of the market". (Polanyi 1957 p 184)

Shiva's observation about modern forestry is illuminating too:

"The forest crisis was an outcome of a reductionist forestry which viewed the forest as a timber mine, not as a central mechanism in soil and water conservation. The separation of the life-giving and life-maintaining functions of the forest from its commercial value has thus led to the destruction of the essential ecological processes to which the forests and trees contribute". Shiva (1989) p 89.

5. Unfortunately Shiva's book reached my hand rather too late to include a review of her main ideas.

6. Recall this widely quoted remarks of an eminent development economist, the late Dudley Seers;

"The questions to ask about a country's development are:

What has been happening to poverty?
What has been happening to inequality?
What has been happening to unemployment?

If all three of these have declined from high levels, then beyond doubt this has been a period of development for the country concerned. If one or two of these central problems have been growing worse, especially if all three have, it would be strange to call the result 'development', even if per capita income doubled". (Seers 1969).

7. The two laws of thermodynamics may be stated as follows:

The first law:
Energy may be transformed from one type to another, but is never created or destroyed.

The second law (also known as the Entropy law):
No process involving an energy transformation will occur unless there is a degradation of energy from a concentrated form into a dispersed form.

This means that in any energy transformation a part of the energy is dispersed and becomes useless; as a result no energy transformation is 100% efficient.

For an ecological elaboration of these laws see Odum (1975); for an economic application see Georgescu-Roegen (1974); For an alternate general interpretation see Prigogine and Stengers (1985; also see Lovelock (1987).

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Urmila Phadnis

The Economic Review records with regret the death of Prof. Urmila Phadnis. Prof. Phadnis Director SAARC Studies at the School of International Studies, Jawaharlal Nehru University, Delhi, was a pioneer Sri Lankanologist and had written a number of books and articles on various facets of politics in South Asia. Her passing away is mourned by all of us who admired her as a scholar and valued her as a friend. Our Department, which she visited on many occasions, is proud to have been able to co-operate with her in her research efforts.