

The Ecologist

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 - Art and the Ecological Crisis
 - Eucalyptus Plantations and Deforestation
 - Economic Growth Vs Sustainable Development
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-



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of the USSR**

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Although much modern art reflects the alienation of living in an industrial society, some artists have refused to succumb to the spiritual poverty of the modern age. Their works overcome nihilism, rekindling a sense of purpose in life and reaffirming our integral part within the biosphere.

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Thousands of hectares in Thailand have been earmarked for reforestation with eucalyptus. The programme will not only deprive local people of their land, it will also accelerate deforestation of natural forest. The beneficiaries will be the Thai business elite and multinational corporations.

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Sustainable development has become the new buzz word. But it is still commonly believed that future ecological security can only be achieved through increased economic growth. The two goals are incompatible: growth in material consumption can only be achieved at the expense of the biosphere — and the earth's capacity to tolerate further abuse is already stretched to the limit.

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Errata: Henryk Skolimowski is Professor of Humanities in the College of Engineering at the University of Michigan, Ann Arbor, not Professor of Philosophy as described in Vol 18 Nos 4/5. We apologise to the Philosophy Department at the University of Michigan.

Printed on recycled paper. This paper has been whitened using peroxide rather than a chlorine-based bleach. Usually *The Ecologist* is printed on unwhitened paper but we have been unable to obtain adequate supplies of this paper due to increased demand.

An Open Letter to Mrs Thatcher

Dear Prime Minister,

It is heartening that you should have chosen the occasion of your speech to the UN General Assembly to address the ecological crisis facing our planet. It was a timely speech and, given the global nature of the problems, a highly appropriate forum in which to make it.

That said, the contents of your speech are worrying. You say that "We have all recently become aware of . . . the prospect of irretrievable damage to the atmosphere, to the oceans, to earth itself." This is surely to pass the buck. There is nothing "recent" about the warnings from ecologists, soil scientists, climatologists and others that our activities are causing irreparable damage to the biosphere. In 1972, a full 17 years ago, we ourselves stated in the Preface to our *Blueprint for Survival*: "An examination of the relevant information available has impressed upon us the extreme gravity of the global situation today. For, if current trends are allowed to persist, the breakdown of society and the irreversible destruction of the life support systems on this planet, possibly by the end of this century, certainly within the lifetimes of our children, are inevitable." Nor, at the time, was this judged a gratuitous statement: on the contrary, it was endorsed by some of the leading scientific brains in Britain, including Sir Peter Medawer FRS (Nobel Laureate), Sir Julian Huxley FRS, Sir Frank Fraser Darling, Professor C.H. Waddington, Sir Macfarlane Burnet and Sir Peter Scott.

On the specific issue of the greenhouse effect, we warned: "The CO₂ content of the atmosphere has increased at the rate of 0.2 per cent a year since 1958. One can project, on the basis of these trends, an 18 per cent increase by the year 2000, from 320 ppm to 379 ppm. This might increase the temperature of the earth by 0.5°C. A doubling of CO₂ might increase mean annual surface temperatures by 2°C." These projections were, if anything, conservative: certainly they are entirely consistent with climatologists' current predictions of the "insidious danger" which we face. We also documented in detail the damage we are doing to terrestrial ecosystems, to the oceans, to food supplies, and to human health. The *Blueprint* received wide publicity and prompted serious political debate. Indeed, Mr Peter Walker, then Minister for the Environment and now your Welsh Secretary, was briefed personally on the report.

Since *The Blueprint*, other reports — some commissioned by governments, others by groups such as Friends of the Earth and Greenpeace — have reiterated the threat to our environment and to our survival. President Carter's *Global 2000* report, published in 1980, could not have been more explicit about the prospects facing humanity. "If present trends continue, the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world we live in now."

We do not raise this issue to make a political point or to nit-pick over words, but because we are alarmed that, despite the wealth of hard data that has existed on the environmental crisis for 25 years and more, you should only "recently" have become aware of its importance. This raises serious questions about the ability of your advisors and the quality of advice you are being given. On the nuclear issue, for example, your government ministers now claim that the true costs of nuclear electricity have only recently come to light. This is nonsense. Seven years ago, we ourselves

published a detailed study, commissioned by us and undertaken by the Committee for the Study of the Costs of Nuclear Electricity, showing quite clearly that the Central Electricity Generating Board was using an accounting sleight-of-hand to disguise the true costs of nuclear power. Seven years later, the CSENE findings have been broadly confirmed. The study concluded: "We contend that the high capital costs of building nuclear plant, their poorer than expected performance, as well as rapidly rising nuclear fuel costs, have already made electricity from nuclear plant considerably more expensive than that from coal-fired plant . . . If other considerations are taken into account — doubts about reprocessing, waste disposal, decommissioning and reactor insurance — then the economic case against nuclear power becomes overwhelming." The study was sent to the relevant ministries and to your own office. It was ignored. Its findings were elaborated upon at the Sizewell Inquiry; they were ignored. A subsequent study, sent to Mr Parkinson, then Secretary of State for Energy, showing that Electricité de France had also falsified the costs of its nuclear programme was similarly ignored.

The question is: why? And why indeed for nine out of the ten years that you have been in power has your government been so dismissive of those who have tried to bring the environmental crisis to your attention? Is it because you have been shielded from unpleasant realities by the civil service? Is it because you have only sought advice from those who share your view of the world? Is it because your advisors have been afraid to give you the true facts? (We note with alarm recent editorial comments in the press suggesting that this was the case with Mr Parkinson over the costs of nuclear electricity). Or is it because, naively, you were willing to trust the data presented by those who stood to gain from misinforming you — the Central Electricity Generating Board, for example.

Indeed, the most troublesome aspect of your UN speech is that you still appear extremely badly briefed as to the fundamental causes of the crisis and therefore its solutions. Throughout the speech, you repeat long-discredited shibboleths. To give you a few examples.

You tell us that we need action to improve agricultural methods: "Good husbandry which ploughs back nourishment into the soil rather than the cut-and-burn which has damaged and degraded so much land in some parts of the world." It is hard, however, to blame "cut-and-burn" agriculture for the massive rate of soil erosion in the USA (4,000 million tonnes of top-soil a year — enough to fill a train of freight cars long enough to circle the earth 24 times) or the increasingly worrying levels of erosion in East Anglia. Illinois and Norfolk may be home to many wonders but, not as far as we know, "cut-and-burn" agriculturalists. Nor is "cut and burn" conceivably responsible for the millions of hectares of agricultural land that have been lost as a result of bringing arid areas under perennial irrigation. Nor for the rising levels of nitrate in groundwaters throughout the temperate world. Nor for the algal blooms that are now a regular occurrence in temperate waters. These are problems that are a direct result of the intensive farming methods that you are promoting as "better husbandry" and which the industrialized North is successfully imposing upon the peasants of the South.

You extol the virtues of multinationals — “far from being the villains, it is on them that we rely to do the research and find the solutions.” But you seem to have overlooked a critical consideration: it is the research of the multinationals which has caused many of the problems in the first place. It was not peasant farmers — “cut-and-burn” or otherwise — who produced PCBs or DDT or CFCs or indeed the nuclear waste that you hope industry will find a means to “make safe”. It was multinational corporations. Moreover, once many millions of pounds have been spent on researching and developing a product, there is an almost unstoppable momentum to put the product onto — and to keep it on — the market, regardless of evidence of harm. Thalidomide was an example; many pesticides too; so also asbestos, whose dangers were known for a full 30 years before US companies agreed to stricter regulations on its use. Even as we write, we learn that ICI is lobbying against restrictions on the production of methyl chloroform, a chemical which is estimated to be contributing as much to current ozone depletion as either of the two most destructive CFCs. Nor does the record of multinationals in the Third World inspire confidence. Frequently, they have chosen to “dump” dangerous products and processes in developing countries, when environmental controls become too tough in the industrialized world (see Steven Shrybman, this issue).

You say we need more research before taking action. “Before we act, we need the best possible scientific assessment: otherwise, we risk making matters worse.” How? When all the evidence suggests that we are heading for massive climatic destabilization, almost *any* measure to reduce greenhouse gas emissions can only be a step in the right direction. There will never be absolute scientific certainty on this issue — and further research is unlikely to reveal anything, other than details, that we do not already know. As *Science* points out, “The fundamental theories of how greenhouse gases trap heat have been substantiated by billions of observations of the atmosphere.” When one is falling from an aeroplane, one needs a parachute, not an altimeter.

You single out growing human numbers as the prime threat to our environment. “Put in its bluntest form: the main threat to our environment is more and more people, and *their* activities: the land *they* cultivate ever more intensively; the forests *they* cut down and burn; the mountain sides *they* lay bare; the fossil fuels *they* burn; the rivers and seas *they* pollute.” (We emphasize your use of the word “they”, when, in this case, your more usual “we” might have been more appropriate).

We would in no way wish to underplay the problem of population growth. But it is difficult to invoke the ghost of Malthus to explain, for example, the current destruction of North America’s forests. What about acid rain? Or the activities of the lumber industry? And with regard to tropical forests, what about logging, ranching, dam schemes, colonization programmes and large industrial projects — these get no mention in your speech.

So too, it is not human numbers alone that are behind the increase in greenhouse gases. The bulk of population growth today is in the Third World, but it is not the Third World that is the major emitter — either today or historically — of either CFCs or CO₂. You cannot blame Indian peasants who have never seen a fridge, let alone a deodorant spray-can, for the rise in CFCs. It is us, the Northern industrialized countries, who are responsible. The figures speak for themselves. The USA, with just 4 per cent of the world’s population, is responsible for some 24 per cent of global CO₂ emissions. India, by contrast, is responsible for just 2.2 per cent of emissions, yet it is home to one sixth of humanity.

Indeed, your speech seems to have failed to grasp the essential nature of the crisis — that it is our industrial patterns of consumption and production that are at the root of the headlong dash to destruction. You tell us, “We must have continued economic growth in order to generate the wealth required to pay for the protection of the environment”. Indeed your commitment to growth is such that although you accept the need to reduce the

emission of greenhouse gases, you believe it vital that “this should be done in a way which enables all our economies to continue to grow and develop.” In effect, the achievement of growth must take precedence over the measures necessary to avert climatic catastrophe.

Of course, we would like to see growth in some sectors of the economy — for example, a large-scale reforestation programme is essential. However, if tree planting is to achieve the desired ecological and social ends, commercial considerations must take a secondary role — the precise opposite of your prescription. Planting eucalyptus and cutting them down every ten years, as is happening throughout the Third World, may increase economic growth, but it is ruinous for both the environment and local villagers (see Larry Lohmann, this issue). Moreover, whilst economic growth enables us to earn the money to pay for new technologies, which may help to ameliorate some of the damage (by reducing pollution for example), there are a whole range of problems that are simply not amenable to fiscal or technological solutions. Growth cannot bring back the Dodo or the “between 3 and 50” species we are losing every day. Growth cannot undo the radioactive contamination caused by the Chernobyl disaster (see Zhores A. Medvedev, this issue). But most important, the economic growth that brings fiscal wealth through increased production and consumption is invariably achieved by cashing in the natural wealth of the biosphere (see William E. Rees, this issue). It is this natural wealth — a stable climate, clean air, fertile soil, and abundant clean water — on which we depend as a species.

You argue that market forces act “as a corrective” against this destruction. “As peoples’ consciousness of environmental needs rises, they are turning increasingly to ozone-friendly and other environmentally safe products . . . the new products sell and those which cause environmental damage are disappearing from the shelves.” But the new ozone-friendly propellants cannot *repair* the gaping hole in the ozone layer over Antarctica. Moreover, whilst it demands little sacrifice from either industry or the consumer to change from one type of spray-can to another, the same is not true when it comes to the major changes that will be necessary if we are really to reduce greenhouse emissions. However aware we the public may be of the ozone hole, we still buy fridges and air-conditioners containing CFCs. And the market (which does not reflect the ecological costs of CFCs) is encouraging us, not discouraging us, to do so.

Nothing could demonstrate the wrong-headedness of your approach better than your decision to donate £100 million to the Tropical Forestry Action Plan (TFAP). As a publicity stunt, it is capital. However, in terms of saving the world’s tropical forests, it is a disaster. The TFAP, as has been exhaustively documented in *The Ecologist*, is *not* a plan to save the forests. As its name makes clear, it is a plan to extend *forestry* — in effect, to promote commercial plantations. Indeed, its conservation programme consists of no more than assisting “in the establishment of a national network of protected areas designed to conserve *representative samples* of ecosystems.” The forests will thus be reduced to ecological Disneyland — a few isolated islands to satisfy tourists and scientists but of little value in terms of the global ecosystem.

We urge you to withdraw Britain’s support for the TFAP. We urge you too to broaden your choice of advisors to include those whom you refer to as “so-called greens”. It is they who have correctly predicted the crisis and diagnosed its causes — not the industrialists, scientists and civil servants whom you have so far relied upon for advice. Much of what the greens have to tell you may at first appear unpalatable. But if we are to leave a world fit for future generations to live in, it is critical that you act on their recommendations.

The Editors

The Arts and Planetary Survival

Part II

by
Denys Trussell

In the first part of this article (Vol. 19, No. 5, September/October 1989) it was shown how our increasing separation from the natural world has been mirrored in growing artistic shallowness and aimlessness. However in the midst of the nihilism of modernism, some outstanding works bring meaning to the modern predicament. Examples from the fields of drama, music, painting, and literature show how art can recover its integral position in human consciousness.

The last task of a dying, reactionary avant-garde is to do away with art. This is the fulfilment of a logic that first rejected the outer world, then any object at all, even the most abstract portrayal of inner processes. So we are left, not with anti-art, but with non-art. The obvious social corollary of non-art is non-existence, just as that of Warhol's consumer images is consumer existence. For, like it or not, these artists are actually making a mimesis of something that is 'out there' in the real world. But their mimesis or 'doing' has been appropriated by the nihilism of their subjects and destroyed as a countervailing statement.

There has been an element of idealism in the non-art process; a wish to strip away the 'illusion' necessary to what is normally art. Art involves a suspension of disbelief. The percipient juggles with the fact that art is and is not of the real world. Mimesis is both reality and an act of imagination. The questioning of this duality in art has led to some artists removing any quality that separates art from reality. In sculpture, for instance, works must "be seen as the real materials from which they are made, not as suggesting other materials."¹

By this it is intended, not just that the percipient of the non-art object should focus on the physical properties of the object, but that the object should be exactly what it is, and nothing more. A sculpture becomes a structure limited to its own physical properties. No sculpture can therefore be distinguishable as art, since, for instance, marble, bronze, timber or paint must not suggest flesh; only flesh should suggest flesh. The representation of the person can only be the actual person, and art has ceased to be.

Sculptures approaching this non-art state are those like the American Duane Handon's *Real People*.² These works are so realistic that their only intention can be to break down the illusion of art and make us confused as to whether we are seeing real people or plastic ones. Banal, hideous and deeply antithetical to life, these are a kind of grotesque mockery of mimesis, showing what happens when an object is copied literally without any intention of interpretation. The 'illusion' of art has been banished: but what remains is the statement of a dead materialism without meaning or *gestalt*.

The breaking down of the distinction between life and art rests on the mistaken notion that art will be thereby brought closer to life. This does not happen. The blurring of the distinction destroys the intrinsic value of each. The illusion of art is essential

to its nature. Because it is an embodying and ordering of elements in the real world, it creates *gestalt*. Its unified complexes of action, sound and imagery enable us to capture reality contemplatively and harmlessly. A non-art object cannot have *gestalt*. How otherwise could it avoid standing out amongst the random objects of experience? And lacking *gestalt*, is there any point in its existence? It has neither practical function nor the qualities that establish a metaphysical ecology.

In an ecologically balanced state of society such as that of the tribal Aborigine, the distinction between art and life was meaningless. Living was an art, saturated with the sacramental and the metaphorical. But in the industrial world, art becomes life at its peril, since life is fraught with banality and meaninglessness. Far from resulting in a universalizing of the aesthetic, the breakdown of the distinction between art and life in our culture destroys art as a source of countervailing values. So the non-art work offers finally, nothingness. It is T.S. Eliot who represented this condition:

"On Margate Sands
I can connect
Nothing with nothing."³

And it is here that neither organic nor spiritual life are a possibility.

Means and Meanings

The non-existence finally arrived at when art repudiates life and nature is paralleled by the growing importance of its means and the lessening importance of its meanings. There has been a deepening confusion about means and ends, whereby the texture of paint becomes more important than the *gestalt* of the painting, sound effects become more important than musical intelligibility, linguistic manipulation becomes more important than the expressivity of a poem, and so on. The seeds of this confusion lay often in the work of great artists like Cézanne, Van Gogh and Matisse, who had no intention of stripping painting of meaning. They wanted to rejuvenate form and colour after its languishing in the hands of nineteenth century academicians. Neither did composers such as Webern, Schönberg and Busoni intend that music should become merely affective sound; nor did writers like Ezra Pound work for a literature reduced to linguistic structure. All these and many others were seeking to renovate the languages of their arts, and to some degree they succeeded in doing

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this. But a fatal tendency lay in this passionate exploration of new artistic means. It at times obscured the fact that art must celebrate something beyond its materials. In lesser hands, valuable aesthetic experimentation could degenerate into superficial aestheticism, and the omnipresent materialism of the artists' society made it all the more difficult for an art of means to carry meaning. The inversion of economic means and ends actually parallels the inversion of means and ends in the arts. In painting this began as an exciting new perspective:

"A number of artists, including Cézanne, began to be interested in the fact that as well as seeing the picture image we may simultaneously see the pigmented canvas, which is a flat plane at right angles to the line of vision and at a specific distance to the eye, with its own textural surface properties. There was a tendency to flatten the pictorial image in order to weaken its illusory effect and so restore visibility to the physical canvas and invite attention to the surface qualities of pigment and texture."⁴

Generally, Impressionism was a strategy of means. It placed emphasis on the wash of sensory particles over the consciousness of the observer, whether it be the flux of light, sound, or in the case of literature, intensely concrete and physical images. Its sensationism was the beginning of the road leading to the appropriation of art by its means.

An intense focus on texture and the medium of works would lead even in the hands of very gifted artists to a weakening of *gestalt*. Two large-scale examples of this are the *Cantos* of Ezra Pound and a musico-electronic work by the contemporary German composer, Stockhausen, entitled *Kontakte* (1960).

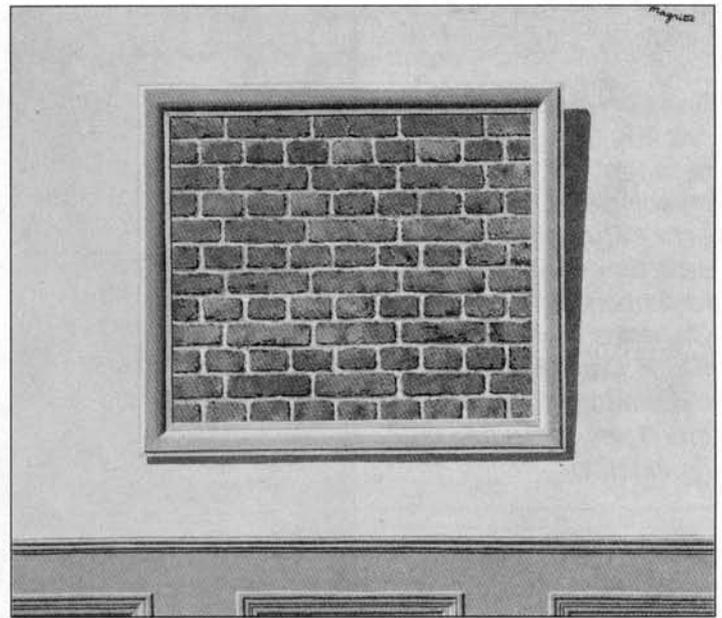
Pound's *Cantos* contain much fine poetry, but his faith in the experimental juxtapositions of his imagery on the page being able to cohere in the mind of his readers was naive. Large tracts of this massive, lifelong work are no less and no more than a jumble of weakly apposite images that fail to gel, despite Pound's artfulness in contriving their positioning. Stockhausen's *Kontakte* is a formidable structure, but fails to convey the *gestalt* of a machine, using the sounds of mechanism from which most human connotations have been purged. The composer's aural means, the sheer technology of the work, becomes its personality. The medium has become the message.

Each of these very different work's exemplifies an imbalance in mental ecology. The discontinuities of the *Cantos*, the engineered sounds of *Kontakte* in their singular ways subvert by their means the human need for meaning.

Theatre and the Return to Atavism

I have painted a bleak picture of the arts under industrial society. But the turbulent century of modernism and 'post' modernism has seen magnificent works created that do make something of the new artistic languages; that do convey transcendent values and a sense of cosmos. Such work is implicitly ecological, because it has a sense of integration, a spiritual ecology which, translated into the collective consciousness, could result in the awareness of the 'one' that is the planet.

In this century, there has been a successful rejuvenation of theatre and a renewed interest in the resources of dramatic performance, be it dance, mime or plays. Theatre has achieved a much greater variety and richness than existed in the high bourgeois period leading to World War I. Then, immediacy of impact was dulled by the assumption that there was only a very



René Magritte (1898-1967), *De Lege Lijst/Le Cadre Vide*. Nihilistic 'non-art' attempts to break the distinction between art and reality, but in doing so it is stripped of both *gestalt* and meaning.

limited relationship possible between drama and its audience: namely that drama 'told' the audience the issues of the action.

The ancient principle of mime and the ritualistic roots of art have, in an enormous variety of ways, been re-explored:

"The Greek word for a *rite*... is *dromenon*, a 'thing done'... The word... arose... from the simple fact that rites among the primitive Greeks were *things done*, mimetic dances and the like."⁵

Now much theatre is returning to the atavistic immediacy of those proto-arts, ritual and mime. Action is often more immediate, dialogue has less speechifying and philosophical abstraction. This greater immediacy, which is now very general, I take to be a genuine radicalism; a going back to the primitive roots of art.

Bertolt Brecht (1898-1956) was the most famous exponent of revitalized theatre. He actually rejected mimesis because of the narrow conventions associated with it by academicians: "by the nineteenth century bourgeois aesthetics had wholly forgotten the traditional implications of mimesis — reacting with a sterile denial of any relation between art and nature."⁶

But in rejecting mimesis Brecht affirmed its real meaning — the doing of an action that was part of the creative energy of nature. Theatre as 'doing' somehow leaves space for the audience to enter more positively into the meaning of the action and not just be passively entertained. This generally re-invigorated dramatic style takes in an enormous variety of 'actions', including the direct theatre of ecological protest. The maritime actions of Greenpeace are sometimes played out as theatre, as are the mimes of street drama.

No consideration of drama is complete without film and television, but both these media have been corrupted by the commercial infrastructure required to produce them. With notable exceptions — film has produced many great works — these media are principally for the dulling of moral sense, judgement and sensibility. They induce apathy, and are thus far removed from the 'dromenon' or ritual and the action of drama. The rare worthwhile film or television programme are heroic gestures by producers under immense pressure to make trash and purvey it; saccharine to coat the bitter pill of boredom in a bored society.

"In an ecologically balanced society, the distinction between art and life was meaningless. Living was an art, saturated with the sacramental and the metaphorical." (Painting by Charlotte Molesworth and Stella Carr. Photo by Ary Diesendruck. Reproduced courtesy of The Gaia Foundation)



The Cosmology in Tonality

Although music is the most abstract of all the arts it still has, dissolved in its very structure, an implicit world-order. The dissolution of the tonal system early in the twentieth century in the music of Arnold Schönberg (1874-1951) and later, Webern (1883-1945), Pierre Boulez (1925-) and Stockhausen (1928-) represents a line of development that gives musical form to the structural crises of 'developed' society. It is my contention that, despite much of beauty and ingenuity in this stream of music, it tends to the abstruse and the excessively intellectual. Certainly, in its latter stages, it posits a sound-world as abstract as the visual-world of Mondrian's geometric platonism and eschews a mimesis of anything in the biosphere.

Ferruccio Busoni (1866-1924), one of the finest composers in the early modern period, was also a far-sighted and profound theoretician of his art. He experimented considerably with musical language, but sounded a note of caution about musical systems that, being too abstract, could be stripped of expression. Unlike Schönberg, whom he supported and respected, he did not ever reject 'tonality' (an hierarchical system of tones in the scale, giving some tones more importance than others, and being centred on a fundamental keytone or 'tonic'). Having watched Schönberg and his pupils strip music of the irrational, but centred cosmology implicit in tonality, and replace it with an abstract, impersonal system of twelve equally important tones, he sensed the danger that the music might come to lack the human fulfilment of resolution:

"The harmony can do no other than draw from the twelve half-tones standing at our disposal, all possible combinations of which have been tried and made use of. The only remaining characteristic is the removal of the consonance, leaving the dissonance unresolved. Whereby the harmony is stunted as a means of expression and the individuality of the author effaced..."⁷

The rigour of the Schönbergian system could at times give the impression of a musical universe where sound structure was more important than expressivity. Composers who were more eclectic in their sources of musical language — Bartok (1881-

1945), Stravinsky (1882-1971) Busoni, Shostakovitch (1906-1975), and in New Zealand, Douglas Lilburn (1917-) — did not perhaps have the exacting internal consistency of the later Schönberg, but their music has in it the drama of character. Many of them were as directly affected as Schönberg by the terrible historical pressures of this century — war, Nazism, Stalinism — but maintained nonetheless an openness of approach. It is my belief that they were successful in making music that contained, yet transcended, the cosmological doubts of the century.

Joining these two broad streams is the singular figure of Olivier Messiaen (1908-), a Catholic who characteristically uses the cries and choruses of birds as the motif of much of his music. Messiaen is often atonal, but it is atonality with the texture of life to it, not of an acoustics studio. Certainly his music has a cosmology; he makes of it a transcendental phenomenon that unifies nature with God.

Composers such as Bartok made great efforts to record the ethnic music of their regions before the tides of war and industrialism obliterated it. The unique melodic and harmonic inflections of such music, rescued by Zoltan Kodaly (1882-1967), Bartok and other ethno-musicologists throughout the world represents a resource of sound from pre-industrial humanity to which we need pay serious attention. These are sound-worlds parallel to, and at times the same as, the worlds revealed in the anthropological researches of James Frazer and others. They are the worlds we have lost, and provide us with aural clues about humanity's early mimesis of the natural world of sound.

Such clues might guide us in selecting elements from ancient or timeless arts that we wish to bring back into our own artistic 'actions'. Many twentieth century composers, following from the lead of Debussy (1862-1918), have borrowed from the more stable musical systems of traditional societies. Notable in the re-discovery of the ethnic and ritualistic roots of music is Stravinsky's huge *Rite of Spring* (1913), which is really an attempt to recreate the primordial rituals of resurrection with the full symphonic resources of the modern orchestra.

The onset of electronic sound poses the question: will it be more or less liable to convey a viable world view? The answer lies in the composer. An example of electronic sound being used

"Picasso's Guernica is a metaphor of our history charged with pity and terror; charged with outrage at machine war and human cruelty. Such is the art, objective yet passionate, that strengthens us. Implicit in it is the human will for survival and integration essential for planetary survival."

beautifully and in a way not implicitly hostile to the natural world is in Douglas Lilburn's subtle electronic setting of Alistair Campbell's poems, *Elegy* and *The Return*. That is not to say that electronic music, or any other should strive, to be arcadian and avoid making a mimesis of the city. It is rather an appeal that music should not be consumed by the technique of its making, that it should not be appropriated to the purposes of the often unsympathetic technological environment, of which it is making a mimesis.

Mimesis and Exorcism in Expressionism

As Busoni was a key figure in the adjustment of music to the 'modern' century, so was Wassily Kandinsky in regard to painting and the plastic arts. Before him, Impressionism and Post-Impressionism had set free the sensuous beauty of colour and light. But the metaphysical resources of these movements were soon exhausted, and by 1890 many artists were moving beyond the play of light to express the features of an inner world. Expressionist painting was born from an impulse to bring out the inner and at times amorphous intimations of the soul.

Kandinsky was a true radical and prolific theorist in the arts, who, nonetheless, eschewed analysis and geometrism. He inclined strongly to the cosmological, pointing the way to painting that had *gestalt*, passion and metaphysical depth, without necessarily being representational. His starting point was a passion for nature that he found well-nigh inexpressible:

"Pink, lavender, yellow, white, blue, pistachio green, flame-red houses, churches — each an independent song — the raving green grass, the deep murmuring trees, or the snow, singing with a thousand voices, or the allegretto of the bare branches ...

These impressions were a pleasure which shook me to the bottom of my soul, which raised me to ecstasy. And at the same time they were a torture because I felt that art in general and my powers in particular were far too weak in the face of nature."⁸

Kandinsky moved into abstract expressionism after attempting representation of nature; but he did so for reasons that are consistent with a natural cosmology, not hostile to it:

"I came to the simple solution ... that the aims (and thus the means) of nature and art are essentially, organically, and by universal law different from each other — and equally great and equally strong. This solution ... does away with the unnecessary torture of the vain task that I had inwardly set myself ... as a result my joy in nature and art rose to untroubled heights."⁹

We may question the differing aims of art and nature that Kandinsky felt, but we cannot question his passionate love for the creation, nor the beauty of some of his own works, which, though non-representational and composed in a universe of art, participate in the cosmos of natural energy. His great belief in the twin spheres of art and nature is a vindication of the life-force and

purpose that these parallel creations share.

His work and thought pose the question that all serious painters must answer in their own way: can one celebrate the creation without some elements of representationalism? The vital spirits in art have done so. The distortions of literal reality that characterise even representational expressionism convey undeniable inner truths about the shapes of the psyche in contemporary humanity. Portraitists such as Oskar Kokoschka (1886-1980), or here in New Zealand, Alan Pearson (1929-),¹⁰ portray a troubled humanity emerging from the terror and love that are the actual backdrop of the century.

The move away from representationalism then is not inevitably escapism or rejection of our natural roots. It is often a compassionate and transcendent portrayal of humanity trying to contain forces that are complex, menacing and bizarre; a mimesis that is also an exorcism, as it so often was in ancient mime and dance. One need only think of Picasso's *Guernica* (1937), so aliteral, at one level, as the portrayal of the ruthless bombing of a human and animal population; aliteral, yet deeply and literally true; a metaphor of our history charged with pity and terror; charged with outrage at mechanised war and human cruelty. Such is the art, objective yet passionate, that strengthens us. Implicit in it is the human will for survival and integration essential for planetary survival.

So Kandinsky's images of a cosmos of feeling, the angularities of cubism and the amorphous, troubled souls peering out of their expressionist depths of the unconscious, while not representational, are actually at one with nature. Implicitly they accept a moral and natural order without being consumed by their means or the suffering they portray.

Writers and the Web of Consciousness

The written word, so besmirched by advertising, propaganda and gutter journalism, still has a critical part to play in the renewal of human culture. Writers are vital in helping establish a 'noosphere' or web of consciousness covering the face of the planet and first hinted at by the philosopher Teilhard de Chardin (1881-1955).¹¹ It is one of the vital tasks of literature to maintain the health of the noosphere; to cleanse it of spiritual pollution, venality and the lies of economism.

In prose, D. H. Lawrence (1885-1930) conducted a fiery and passionate war against the state of industrial capitalism. His powerful indictment forms an important backdrop to the more recent literature of protest. If we look for a universal voice, equal to modern history, I think it is heard in the work of the Chilean poet, Pablo Neruda (1904-73). Unlike Eliot, Neruda did not lose himself in the 'unreal city' of despair. He was planted firmly on the long strip of coast, desert, forest and mountain that forms his country. But he was far from parochial. His chief collection of poems is called *Residence on Earth*, no misnomer for a man who

lived and worked over much of the planet. He spread himself from Rangoon to Paris, from the bitter battlefields of the Spanish Civil War to the vast sea and coast of the Pacific. His poetry is saturated with nature, with history and with an unflinching courage and humanity in the face of the state violence that seems finally to have taken his life.¹²

“When rice withdraws from earth
the grains of its flour,
when wheat hardens its little flanks and lifts up
its thousand-handed face,
I hasten to the arbour where man and woman are linked
to touch the innumerable sea
of what endures.”

This man, who lived out the terms of modern history unto death, proved that evil need not engulf the life of art; and the cycles of a universal nature turn through the structure and imagery of his poems:

“How long does the hand of the woods in the rain
bring me close with all its needles
to weave the lofty kisses of the foliage?
Again
I hear approach like fire in smoke,
spring up from earthly ash,
light filled with petals,
and pushing earth away
in a river of flowerheads the sun reaches my mouth
like an old buried tear that becomes seed again.”¹³

Neruda united the contradictory worlds of nature and history. Born where nature was an overwhelming presence, he entered history, full of the stylistic possibilities of modern poetry. And, as a visionary socialist, he had a practical political commitment to bettering the lot of the poor in Latin America. He is an artist silenced neither by economism or aestheticism, his poetry implying the complete acceptance of nature as the matrix of human life and history. It is as residents on earth, as far as Neruda is concerned, that we work out a humane society.

For writers, it's been a matter of not betraying the muse, that elemental female who took over the spirit of the makers of the dithyrambs, the dances and the songs of birth and death. As Robert Graves has shown in his study, *The White Goddess*, the muse working through the gifts of her poets, played a part in adjusting nature and society cosmologically:

“The function of poetry is religious invocation of the Muse: its use is the experience of mixed exaltation and horror that her presence excites. But ‘nowadays’? Function and use remain the same; only the application has changed. This was once a warning to man that he must keep in harmony with the family of living creatures among which he was born, by obedience to the wishes of the lady of the house; it is now a reminder that he has disregarded the warning, turned the house upside down by capricious experiments in philosophy, science and industry, and brought ruin on himself and his family.”¹⁴

The Role of the Muse

This the modern literary artist must do: affirm the Muse and remind us of the depth of our arrogance and error. Poetry and prose, given to truth at this level, are a fragile shield of sensibility that works for the protection of the ecosphere.

Not that the writer can have a simple relation to the earth or the Muse. The pain of dichotomy, of good and evil, the duality of necessity and choice, the enigma of death, are suffered by human consciousness, and are part of the inevitability in nature.

The wholly innocent relationship in the primordial garden has long gone, and a mimesis of death as well as life must be, in order that life can go on. Judith Wright, an Australian poet, has written:

“Earth is a sad yet glittering star.
Bodied in beast and man and bird,
she seeks her vision and her fear,
old Chaos and the shaping word;
and we who travel on her path
hold ecstasy and nightmare both.”¹⁵

But it is this planet that is our fate. No other. And by honest enactment of the processes and patterns of the life it supports we can again be its residents. Residents on earth. The false gods of economism cannot be overturned by art alone; but at least art can act through its ancient mimetic role in prefiguring and dramatising their overthrow. The energy to do this is derived from the planet herself, as was fully acknowledged in New Zealand fifty years ago by one of its poets, A.R.D. Fairburn:

“Fairest earth
fount of life, giver of bodies...
deep well of our delight, breath of desire,
let us come to you
barefoot, as befits love,
as the boy to the trembling girl,
as the child to the mother:
seeking before all things the honesty of substance,
touch of soil and wind and rock,
frost and flower and water,
the honey of the senses, the food
of love's imaginings; and the most intimate
touch of love, that turns to being;
deriving wisdom and the knowledge of necessity;
building thereon, stone by stone,
the rational architecture of truth, to house
the holy flame, that is neither reason nor unreason
but the thing given,
the flame that burns blue in the stillness, hovering
between the green wood of the flesh and the smoke of
death.
Fair earth, we have broken our idols;
and after the days of fire we shall come to you
for the stones of a new temple.”¹⁶

References

- Osborne, H., *Abstraction and Artifice in Twentieth Century Art*, Clarendon Press, Oxford, 1979, 184.
- Duane Hanson's *Real People* visited Auckland, New Zealand in 1988.
- Eliot, T.S., 'The Waste Land', from *Collected Poems 1909-1962*, Faber and Faber, London, 1963, 74.
- Osborne, H., op. cit., supra 1.
- Harrison, J., *Ancient Art and Ritual*, Moonraker Press, Bradford-on-Avon, 1978, 15.
- Savin, D., 'The Mirror and the Dynamo', in Lee Baxandall (ed.), *Radical Perspectives in the Arts*, Penguin, Harmondsworth, Middlesex, 1973, 73.
- Busoni, F., 'Concerning Harmony', in *The Essence of Music*, Rockcliff Publishing, London, 1957, 25.
- Osborne, H., op. cit., supra 1, 103.
- Ibid.
- Other painters working in the antipodes who have painted powerfully in the style of figurative expressionism are the Australians, Arthur Boyd and Albert Tucker.
- Tielhard de Chardin, *The Phenomenon of Man*, Collins, London, 1966.
- Uncertainty surrounds the death of Neruda during the 1973 fascist coup in Chile, which overthrew the government of Salvador Allende, a personal friend of Neruda.
- Neruda, P., 'Born in the Woods', from *Residence on Earth*, Souvenir Press, London, 1976, 227.
- Graves, R., *The White Goddess*, Faber and Faber, London, 1981, 14.
- Wright, J., 'A Child's Nightmare', from *Selected Poems*, Angus and Robertson, Sydney, 1978, 143.
- Fairburn, A.R.D., 'Dominion', from *Collected Poems*, Pegasus Press, Christchurch, 1967, 29.



Villagers evicted from a National Reserve Forest in Chachoengsao take their protest to Parliament in Bangkok in March 1989. Well-informed sources say that the land they formerly occupied will be planted to eucalyptus by the Soon Hua Seng firm. (Photo: PER)

Commercial Tree Plantations in Thailand: Deforestation by Any Other Name

by
Larry Lohmann

The proponents of large-scale industrial afforestation schemes in Thailand are using environmental concerns as a smokescreen for the commercialization of common lands and the destruction of the rural subsistence economy. Hundreds of thousands of local people will be thrown off their lands, many with little option but to encroach on the country's remaining forests thus exacerbating the deforestation crisis. Rural activists are fighting for their livelihoods against multinationals, aid agencies and the Thai business élite who are vigorously promoting the plantations.

“Starting as early as the thirteenth century, the landed aristocracy, increasingly squeezed for cash, began to view their estates not merely as ancestral fiefs, but as sources of cash revenue. In order to raise larger cash crops, they began to ‘enclose’ the pasture which had previously been deemed ‘common land’... By (the end of the process), some ten million acres, nearly half the arable land of England, had been ‘enclosed’... The enclosure movement... brought into productive employment land which had hitherto yielded only a pittance... Enclo-

sure was the means by which England ‘rationalized’ its agriculture... But there was another, crueller side to enclosure. As the common fields were enclosed, it became ever more difficult for the tenant to support himself. At first slowly, then with increasing rapidity, he was pressed off the land...”

Robert Heilbroner,
The Making of Economic Society.¹

In Thailand’s Buriram Province, the villagers have a saying: ‘Behind us, the forest we lean on, in front of us, the struggle with eucalyptus’. The epigram may have an enigmatic ring to outsiders. But to rural Thais, the message comes across loud and clear: commercial eucalyptus plantations

are incompatible both with forest conservation and with village livelihood.

The basic issue is land. All over Thailand, as world demand for wood chips soars, eucalyptus companies are being encouraged to rent large swathes of National Reserve Forests. In the last five years the area under eucalyptus has shot up from 136 to 1100 km², and, in all, some 30,000 to 41,600 km² may ultimately be taken over by private plantation firms. Without title to this land, the more than four million people already living illegally in the National Reserve Forests face two alternatives: move out, or stand and fight.²

In Buriram and elsewhere in north-eastern Thailand, villagers are increasing-

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ly opting for the latter. They do not have much choice. The plantations eat up farms, communal grazing grounds and community woodlands. Even when villagers are allowed to use plantation land, there are few benefits to be reaped there. *Eucalyptus camaldulensis*, the dominant variety in the plantations, allows little intercropping (villagers say it is 'selfish' in that it monopolizes nutrients). It is useless for fodder, damages local soil and water regimes, and supplies little firewood to the community. It provides none of the natural forest products that rural dwellers on the edge of the market economy rely upon. Every five or six years it is harvested just like any other export crop, leaving the ground temporarily bare. Labour needs on the plantations, moreover, are small. And because eucalyptus is seldom planted by small farmers themselves, the benefits generally go elsewhere.³

Migrating out of plantation areas, on the other hand, solves few problems. In Thailand the frontier is nearly gone,⁴ and villagers are well aware that to encroach on what little forest does remain is to cut the ecological ground from under their own feet by destroying fragile watersheds and sources of food and soil fertility. Nor do the cities offer attractive or permanent alternatives. The Thai urban economy, like many in the Third World, will probably never be able to absorb more than a minority of the population.⁵

The Explosion of Rural Activism

Traditionally defensive about the land they occupy, northeastern villagers are keenly aware that, whatever path Thai development follows, older patterns of common land use will have to be maintained to supplement income earned in the modern economy, and that this is inconsistent with the spread of eucalyptus plantations. The result has been an explosion of rural activism unprecedented in the Northeast since the mid-1970s.⁶ Small farmers are standing up to assassination threats; weathering the contempt of bureaucrats; petitioning Cabinet officials; arranging strategy meetings with other villagers; calling on reserves of political experience going back decades; marching; rallying; blocking roads; ripping out seedlings; chopping down eucalyptus trees; burning nurseries; planting fruit, rubber and forest trees in order to demonstrate their own conservationist awareness; explaining to newspapers the methods by which they

have preserved their local forests for generations; speaking out at seminars; giving television interviews; and, increasingly, taking their case directly to the central government.⁷

Their message is simple. They want individual land rights. They want community rights to local forests which they will conserve themselves. They want a reconsideration of all existing eucalyptus projects. And they want the right to veto any commercial plantation scheme in their locality.⁸

They are not likely to back off from these demands easily. Buriram leader Kham Butrsri expresses the determination of many villagers: "Give in, and we'll take what we demand; don't give in, and we'll take it anyway." In Nam Kham and Toey villages in Roi Et, Pa Kham District in Buriram, and Siew village in Sri Sa Ket, among others, farmers have already made good this promise by fighting plantation companies to a stand-off.⁹

Plantations and Unemployment

A little arithmetic confirms that, even from a crude economic point of view and using assumptions highly favourable to the eucalyptus industry, the villagers have excellent reasons for resisting. It is generally accepted that there are perhaps one million families living on the approximately 61,600 km² of National Reserve Forests targeted for 'reforestation'.¹⁰ If it is assumed (conservatively) that 30,000 km² of that is to be planted to eucalyptus by private firms, probably about half a million families would be affected.

How many of those families could support themselves on the eucalyptus plantations? One clue comes from the Anglo-Dutch transnational, Shell, which says it would be able to employ about 1000 local people on its projected 2000 km² operations. Assuming (generously) that each person so employed would be able to support an entire family, that yields the figure of one family per 20 hectares. This is roughly in line with the conclusions of a 1979 Swedish study, which suggested that 100 hectares of eucalyptus plantation would provide jobs for only two to three people.¹¹ Doubling the Shell figure to give the eucalyptus industry the maximum benefit of the doubt, we get the working number of one family per ten hectares. That suggests that at most 300,000 families would be able to remain on the land (assuming they were willing to forego subsistence security for dependence on

a highly uncertain modern sector).

What would happen to the remaining 200,000 families? Where could they be resettled? Not in forests, presumably; everyone agrees these must be preserved. Yet, according to the Thai Development Research Institute, "land suitable for agricultural use has now almost completely been utilized."¹² That leaves land which is unsuitable for agriculture — meaning that each family would probably need well over the current average farm size of about four hectares, or more than 8,000 km² for all 200,000 families.

Leaving aside questions of appropriate land use, where would this huge amount of land come from? The truth is that it is not available. The government cannot find land to resettle even the relatively few villagers whose land was buried by sand in the floods in southern Thailand in 1988.¹³ Locating an additional 8,000 km² (or, more probably, many times this amount) is out of the question, barring land reform, which is an untouchable topic under current political circumstances.

Industry Before Ecology

It may be wondered why nobody in the think-tanks, boards and ministries involved in formulating plantation policy have performed these simple calculations, or why such projections fail to appear in any of the thousands of pages of official documents produced on forestry and land use each year. The obvious answer is that both bureaucracy and industry are aware of the problems, but want urgently to get large plantation schemes started now. Discussion of the social and ecological disasters which would result from 30,000 km² of plantations, might jeopardize even the 5,000-10,000 km² contemplated for the short term. Also, if discussion of these problems can be prevented in Bangkok now, in five or ten years it may be too late to stop the plantations.

The wood industry has been encouraged to proceed with its plantation programme by the lack of resistance to eucalyptus in areas outside the Northeast. In the Central Region, for example, many villagers are accepting eucalyptus companies' payments for land they are occupying (they are not organized to fight on legal grounds and are sometimes subject to serious threats) then moving on to dwindling forest reserves elsewhere.¹⁴ Other residents of the Central Region are being encouraged to become contract farmers under agribusiness schemes which would

make them dependent on parent companies (often Japanese) for seedlings, materials, and cash for the harvested crop.¹⁵ This is bound both to induce farmers to clear new areas for eucalyptus in forested uplands and to squeeze poorer members of the community through debt and dependence, but organized protests are unlikely.

Increasing Integration into the World Economy

The sudden boom in eucalyptus is largely due to Thailand being well-placed geographically to satisfy the growing, artificially-stimulated Japanese demand for wood chips and paper pulp.¹⁶ It has also been encouraged by export-oriented development policies giving the world economy increasingly direct control over rural areas.

Under cover of the rhetoric of "correcting the sectoral imbalances between urban and rural areas" which have resulted from earlier phases of modernization, these policies are shifting the focus of 'economic development' more and more to the provinces.¹⁷ As a result, many of the countryside's natural and social features are now being restructured for direct use by the world market. World Bank-supported replanting schemes, for example, have intensified the Southern rubber industry at the expense of villagers who used to be able to keep animals or harvest the odd food plant among the rubber trees.¹⁸ Thanks partly to special tax incentives provided by the government, shrimp farms producing for luxury markets abroad have succeeded in reducing mangrove forest cover along the country's coastlines from

1920 km² in 1985 to between 320 and 1280 km² today — with disastrous effects on fish populations, wood-gathering, coastal ecosystems and small fishermen's livelihoods. The spread of resorts and industrial enterprises in rural areas is also steadily undercutting the ability of local residents to support themselves on the land.¹⁹

Eucalyptus plantations fall into place as one part of this general trend. Partly because of its biological properties, the tree is exceptionally efficient in allowing the world economy to annex supposedly 'marginal' areas, smash the remaining non-economic or semi-economic patterns of livelihood and nature conservation there, and convert the fragments into 'resources' for global exchange. As land is concentrated and transformed into a substrate for eucalyptus, local villagers will be cut loose to seek niches as producers, consumers, recyclers or (in the case of prostitutes) commodities in the world economy. Because such niches will not always be available, many people will become simply expendable.²⁰

Thus the largest domestic eucalyptus firm, Soon Hua Seng, with the help of its Japanese partners, plans soon to plant 480 km² of eucalyptus to feed a projected US\$800 million, 1000-tonne-a-day pulp mill in Chachoengsao, one of the largest factories of its kind in the world. Some 112 of the 160 km² it already holds rights to are on National Reserve Forest land, either naturally forested or already occupied by villagers.²¹ Indo-Thai Pulp Co., Ltd., a firm affiliated with the Indian giant Birla, plans to set up another massive pulp mill, this time to produce rayon, near the provincial capital of Ubon Ratchathani.²²

Large areas of eucalyptus will again have to be planted nearby in order to feed the mill, but the forestry bureaucracy, as usual, is treating the case as if there were not already people living on the land in question. Phoenix Pulp and Paper is negotiating with the Royal Forestry Department (RFD) to rent about 160 km² of similarly-occupied land in the Northeast to plant eucalyptus and bamboo to supply its mills.²³ And Japan's Oji Paper is leading a consortium of 15 Japanese paper makers in a joint venture with Thai firms called Thai Eucalyptus Resources (chaired by the outgoing Acting RFD Director-General Yookti Sarakaputi) which will promote the planting of 2000 to 3000 km² of eucalyptus to produce chipboard for export.²⁴ The takeover of land currently being used by villagers will again be unavoidable. Domestic companies such as Siam paper, Saha Wiriya and some 300 other firms are proceeding with no less determination to secure land for expanded wood production.²⁵ Only one large domestic paper-producing firm, Siam Cement, is planning to plant substantial acreage on land it already owns.²⁶

Shell and Eucalyptus

European multinationals are also poised to capitalize on the coming eucalyptus boom. Through its Waste Watch programme in the UK and other efforts, Royal Dutch Shell has been trying hard to convince Westerners that it is serious about environmental protection (*see* Robin Murrell, 'The Unacceptable Face of Environmentalism', *The Ecologist*, Vol. 19, No. 3, May/June 1989). Evidence from Chantha-

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Angry villagers cutting down eucalyptus trees at a village forestry office in the Pakhaam District of Buri Ram in March 1988. (Photo: Project for Ecological Recovery)

buri province in Thailand suggests, however, that the company's new-round 'green consciousness' may not extend as far as Southeast Asia.²⁷

Shell is planning to plant 200 km² of eucalyptus in Khun Song National Reserve Forest to produce wood chips for export to Japan and Taiwan. The company has consistently brushed aside warnings from NGOs, villagers and fruit growers that the plantations would cause overwhelming environmental damage.

One of the major objections to the project is that it would threaten some of east Thailand's last areas of primary forest.²⁸ The Royal Forestry Department found that 76 per cent of the original 200 km² concession requested by Shell consisted of primary tropical evergreen forest, and although Shell has since taken out a supplementary, less-forested concession area, doubts remain.²⁹ Already-degraded areas which would be used for planting eucalyptus are separated by zones of primary forest which would have to be breached to connect the plantation areas.³⁰ The new roads, electricity lines and other infrastructure required for the project would directly impinge on primary forest and also bring in a flood of marginalized villagers who would clear yet more forest. Finally, the eucalyptus plantations themselves, even if confined to already denuded areas, would inevitably damage neighbouring natural forests through increased soil erosion, climatic changes and a lowering of the water-table.³¹

Corporate Deforestation

Shell insists that it will not cut a "single tree" to make way for its plantations, pointing out that to do so would be against the law.³² But in other National Reserve Forests, where trees have been cut down to plant eucalyptus with the open collaboration of government officials, the law has proved to be a weak guarantee against corporate deforestation.³³ Shell's continuing refusal to release detailed forest maps of its concession area, as well as a false claim made to Friends of the Earth UK that its concession area contained no natural forest, has done little to relieve environmentalist suspicions.³⁴ Shell also claims that, instead of encouraging further encroachment, its plantation areas will serve as 'buffers' which will prevent villagers from reaching neighbouring primary forests.³⁵ In reality, however, plantations would serve as pathways rather than barriers.

Many of the encroachers taking advantage of this access to new unsettled areas would be those evicted from Shell's own plantation scheme. The company admits that one of the reasons it chose the site in the first place was that it would be relatively cheap to evict and compensate the 4000 or more villagers already living there, since they have no legal land or usufruct rights. Shell also concedes that employment on its plantations will be limited to a mere 1000 local people.³⁶ Under a more equitable division of the same land, ten

times that many could be accommodated, with superior livelihood security and ecological benefits, provided each family planted two hectares of fruit and rubber trees.³⁷

Another objection to the project is that it would undermine the environmental foundations of the local agricultural economy. Local residents have pointed out that the Shell operations would be located in a sloping upland catchment area feeding more than 30 streams essential to maintaining the region's fruit economy.³⁸ Even the FAO admits that in such circumstances, erosion and reduced stream flow is likely, and the risk of flooding increased.³⁹

Evicted villagers forced to encroach elsewhere or to depend on an industrial economy unprepared to absorb them, would only add to the economic problems of other areas. There would also be high 'opportunity costs' in that the area's climate and ecology are well-suited to durian, mangosteen, rambutan and mango, giving it a comparative advantage over Australia, Israel, or Taiwan. The Appropriate Technology Association calculates the return per hectare for fruit would ultimately be more than twice Shell's projected profits from eucalyptus.⁴⁰ Added to this would be the cost of rehabilitating depleted and hardened soil after five or six crops of eucalyptus.

Shell asserts that existing cassava cultivation in the concession area is more environmentally damaging than eucalyptus, but does not tackle directly the question of opportunity costs or costs of reduced water-flow, encroachment or soil degradation.⁴¹ It contends that its eucalyptus plantations would be useful for purposes other than industrial wood in that they would be "friendly" to wildlife, but here again the evidence is strongly against the company.⁴² Shell says also that the case of Brazil proves the environmental viability of eucalyptus plantations, but a closer look at the history of the tree in that country reveals many ecological problems, including displacement, forest cutting, species impoverishment etc.⁴³

Tree Farms Versus Forests

Shell has only one serious defence against charges that the land would be better used for villages and fruit and rubber orchards. This is that only large firms such as itself can muster the capital to undertake the rapid and extensive reforestation which the country needs so badly. This conten-

"Shell agents in Chanthaburi are using both bribery and threats of physical violence to induce villagers to vacate the land they are occupying so that the company can rent it from the government. Warnings of forcible eviction by Forestry Department personnel are commonplace and houses have been put to the torch..."

tion, however, is easily refuted. First, if the type of reforestation in question leads to further depletion of natural forest (whether directly or indirectly), nothing is going to be gained. Second, companies like Shell are not planting *forests*, but rather tree farms which have to be razed to the ground every five or six years to be profitable. Third, and most important, the company's argument is based on the assumption that to be practicable, *reforestation must be undertaken for corporate profit*.⁴⁴ If this assumption is believed, then Shell's claim that only *eucalyptus* operations will be able quickly to blanket the countryside with trees very likely follows. No multinational is going to find it profitable at present to invest in comparable plantations of fruit trees, teak, dipterocarps, or variegated selections of native species. But the assumption is false. Indeed, rapid and ecologically and socially responsible reforestation of large areas in Thailand is far more likely to take place *outside* the larger market economy than inside. There is no Thai precedent for successful commercial replanting of any kind, while community-initiated reforestation and forest conservation undertaken to benefit local livelihoods has been going on for years (although virtually unnoticed by officials), in village after village across the country.⁴⁵

Bribery and Violence

The tactics being used to push the Shell scheme give perhaps the most damning demonstration of the unwillingness of the company to take proper responsibility for its actions. While Bangkok-based Shell executives press the Thai government to grant the plantation project special privileges as an investment which will benefit the country, Shell agents in Chanthaburi are using both bribery and threats of physical violence to induce villagers to vacate the land they are occupying so that the company can rent it from the government. Warnings of forcible eviction by Forestry Department personnel are commonplace,

houses have been put to the torch, and several villagers have been arrested on charges of encroachment, resulting in a large local demonstration.⁴⁶ According to Wittoon P.P. Charoen, of the Project for Ecological Recovery, Shell have even set up a boxing camp in the area to encourage gambling; the more indebted the villagers become, the easier it will be to buy them off. Businessmen profiting from the land speculation brought on by Shell's initiative have meanwhile not hesitated to make their support of the project known. The house of Chanthaburi's governor was shot up by unknown gunmen in February 1988 in what was apparently a heavy-handed hint to him to drop his opposition to the scheme.⁴⁷ Through all this, Shell (Thailand) Managing Director Sarisdiguna Kit-tiyakara continues to launch *ad hominem* attacks against opponents of the project from his office in Bangkok. "Environmentalist" objections, Sarisdiguna says, come in reality from tapioca mill owners whose raw-material source will suffer from the new arrangement and from Thais who are being "subverted" by Western paper-producing countries that feel threatened by the prospect of a local paper industry.⁴⁸

Eucalyptus and the Technocracy

Whatever its effects on rural life and ecosystems, the drive toward establishing large-scale commercial eucalyptus plantations meshes beautifully with the current views and needs of Thai elites. To a technocracy trained to concentrate on growth in export income and chronically susceptible to the blandishments of big business, eucalyptus seems a perfect way of cashing in the 'underutilized resource' of 'degraded' National Reserve Forest land.⁴⁹ Special privileges have been granted to several plantation operations by the Board of Investment, and a law encouraging tree plantations was passed in 1989.

To local businessmen, meanwhile, eucalyptus offers opportunities to make huge profits and sometimes amass land into the

bargain.⁵⁰ As in the case of the English enclosures, the relatively 'pure' market forces behind the eucalyptus boom also find a willing ally in relatively feudalistic elements, in this case the RFD, which regards itself as the 'owner' or 'steward' of about half the country's land. Just as the RFD once granted timber companies 30-year logging concessions, it is now granting concessions to eucalyptus firms for the same length of time — but at even cheaper rates (rent is officially about US\$1 per acre per year). The RFD has even set up a special office devoted specifically to promoting commercial tree farms.

Best of all, by opening the way to tree plantation companies, the government can be seen to be discharging its responsibility to "reforest the country" in the wake of the January 1989 ban on commercial logging (see Larry Lohmann, 'Forestry in Thailand: The Logging Ban and its Consequences', *The Ecologist*, Vol. 19, No. 2, March/April 1989). In vernacular Thai, eucalyptus farms are referred to as *paa yookaa* ('eucalyptus forests') or *paa plook* ('planted forests'), and both the bureaucracy and the companies are making the most of the implication that plantation firms are engaged in some sort of conservationist activity.⁵¹ This conveniently obscures the fact that logging concessions and plantation concessions are merely successive stages of the same process of economization of land and forests that has been deforesting the country for more than three decades.⁵²

Aid for Eucalyptus

Backing the eucalyptus boom is an impressive international network of multinationals, UN organizations, and bilateral agencies working in roughly similar directions. As long ago as 1981 the Japan International Cooperation Agency (JICA) set up a trial eucalyptus plantation in north-east Thailand to support research and training in the field, and it has also funded surveys and aerial photography for National Reserve Forest management

A villager in Nam Kham village in Roi Et province points to where tractors cleared secondary forest to plant eucalyptus. The forest had been used by the local community as a source of vegetables, mushrooms and other forest products. The local villagers blocked the tractors from clearing the rest of the forest, which still stands in the far background. (Photo: Project for Ecological Recovery)



plans.⁵³ Japanese Official Development Assistance, meanwhile, is considering making a grant of US\$500 million over the next five years to the *isan khio* project intended to 're-green' the arid Northeast using eucalyptus farms and other projects.⁵⁴

No less important has been the support of the World Bank, the United Nations Development Programme (UNDP), the UN Food and Agriculture Organization (FAO) and the World Resources Institute (WRI), whose Tropical Forest Action Plan (TFAP) focuses chiefly on the development of industrial wood supplies for the world market (see *The Ecologist*, Vol. 17, No. 4/5, July/October 1987).⁵⁵ Sharing this focus are the FAO-coordinated Forestry Master Plans (FMPs) now being undertaken in dozens of Third World countries with the help of UNDP, bilateral agencies and the Asian Development Bank.⁵⁶ Thailand's own FMP, to be laid out over the next three years with support from the Finnish aid agency, FINNIDA, will probably be mapped out by the giant Finnish consulting engineering firm Jaakko Poyry Oy, which has been lobbying Thailand to formulate such a plan for some time, and whose record in both tropical and temperate forest areas is largely one of destructive commercial exploitation and plantation promotion.⁵⁷ The Thai FMP's Terms of Reference, co-drafted by Markku Simula, who also helped formulate the TFAP and has served both FAO and the World Bank, sets aside more than 90 per cent of the planning budget for forest industry-related matters. In a document of more than 40 pages, less than half a page is given to consideration of local, non-market use of forests, and not much more to conservation. The main thrust is to "maximize the economic benefits obtainable through forestry development" through "increased forest production" and the "development of other sectors".⁵⁸

Such official international initiatives go a long way toward ensuring that, in the language of Jaakko Poyry, "investments in forestry programs and industrial projects will prove viable."⁵⁹ First, they take on a

lot of the planning, coordinating and technical costs that companies would otherwise have to shoulder themselves. Second, they strengthen official institutions which can lend a hand to the wood and paper industries. Third, they provide political support and moral authority for the plantation boom.

In a country where acronyms like 'FAO', 'UNDP' and 'WRI' have great incantatory value for officials, the ideological backing supplied by such supposedly 'neutral' organizations is particularly important. FAO and the TFAP are mentioned frequently by Thai bureaucrats and businessmen in their newspaper articles and public relations documents justifying eucalyptus plantations.⁶⁰ FAO scientific papers, because of the way they organize the data, tend to carry a built-in bias in favour of big business and against environmental balance.

How FAO Defends Eucalyptus

Many observers view the eucalyptus debate as one which mainly concerns the agronomic advisability of growing a certain kind of exotic monocrop in tropical or semi-tropical environments. It is not. At issue is not only what eucalyptus does to the water table, the soil, and other plants, and when, but at least two further questions. One is what sort of social, economic or political systems eucalyptus plantations tend to encourage in particular circumstances. The other is the effect these systems will have on humans and their environment in the longer term.

Thai villagers and environmentalists are concerned about all three issues. In their

experience eucalyptus is not only a soil degrader but also a crop destroyer, depriver of fodder, flattener of natural forests, dispossessor of land, destroyer of security, creator of poverty and dependence, and annihilator of the knowledge of future generations about how to live on the land in a community.

Among FAO forestry consultants, this kind of talk inevitably gives rise to accusations of 'bias'.⁶¹ The consultants contend that village and environmentalist criticisms of eucalyptus are unfair in at least three respects:

- (1) The criticisms imply falsely that all of the 600 species of eucalyptus are environmentally or socially harmful in all circumstances.⁶²
- (2) They unfairly single out the tree on the grounds that it is an exotic and that it depletes the soil over time if no fertilizer is added. In fact, both of these are also features of most agricultural crops and ornamentals in most places.⁶³
- (3) They wrongfully convict the tree itself on the ground of the uses to which it has often been put. Admittedly, there have been some problems, but if 'qualified objective personnel' assess the ecological merits of planting in each particular case and the 'overall needs of the community' are carefully considered first, then the right decision will be made.⁶⁴

The Fallacy of FAO's Arguments

Point (1) sets up a straw man only to knock it down. Villagers and environmentalists

are generally perfectly willing to concede the merits of planting certain species of eucalyptus in certain environments and social settings. Their objection is to eucalyptus as it is used in their locality or country. While the great variety in the *Eucalyptus* genus may be an interesting academic topic, it is irrelevant to the social and ecological issue in Thailand; commercial interests there have already made it clear that *Eucalyptus camaldulensis* is their preferred species.

Point (2) also attacks a straw man. Thai villagers and environmentalists do not object to eucalyptus solely because it is an exotic or because it depletes the soil. They are not so ignorant as to believe that exotics are always bad or that many of the crops they plant, such as cassava and maize (corn), do not also deplete the soil. When they object to eucalyptus, it is because it is being used to do something additional that cassava, corn, and rubber do not do — replace communal forests, grazing land and family farmland, and violently undermine the ecological basis of local subsistence.

Point (3) is more interesting. It suggests that in any particular location, (a) the significant ecological characteristics of eucalyptus can be defined by 'experts' in an unbiased way, (b) the 'experts' are likely to be better equipped to consider these characteristics 'objectively' than the residents, and (c) 'expert' conclusions about the ecological effects can be used equally well by all sides in the debate, including the community. All of these statements are false.

To take them in order:

- (a) What are the ecological characteristics of eucalyptus? Even the form of the answer to this question will depend on one's outlook. An FAO expert investigating biomass production, for example, may look at the ratio of water uptake to wood output over short periods.⁶⁵ Vandana Shiva and Jayanta Bandyopadhyay, on the other hand, look at total biomass production (including fruits and seeds, green manure, etc.) over longer periods.⁶⁶ Both are presumably relying on replicable data, but the picture they give of the tree will obviously be completely different. Even when considering precisely the same topics, FAO experts and villagers and environmentalists tend to choose different data sets and come up with different conclusions, and one data set may well be no more reliable than another. Finally, the value placed on different ecological

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"The eucalyptus struggle is only one stage of a much longer and larger conflict in rural Thailand between economization on the one hand, and livelihood and environment on the other."

—

characteristics will vary from researcher to researcher. An FAO expert may speak as if a plant's ecological aspects and end-uses which support the modern plantation economy are to be given a value equal to those which nurture vernacular ways of life.⁶⁷ Thai villagers, on the other hand, would regard this seemingly 'even-handed' valuation as having a hidden slant in favour of the larger market economy, since so few eucalyptus products are locally useful and so many useful to industry.

- (b) It has become generally accepted, even in 'development work', that local people are likely to have much more detailed information about many aspects of the effects of a crop or tree on their land and livelihood than any outside expert. For example, only local people know which types of forest fodder make their local breeds of animal happiest, and what exactly these animals would be deprived of by eucalyptus. Outside experts suffer a severe handicap in this respect even before they start, since they will not be the ones affected and so do not have the proper motivation to examine the issue carefully. The time span considered by local residents may also be longer than that considered by outside experts interested mainly in short-term production. None of this is to deny that villagers' closeness to the situation makes them 'biased'. Rather, it is to point out that the 'experts' distance from local nature-community interactions, as well as from the effects of their work in the village or the country over the long term, makes them equally 'biased' — though in a way most environmentalists would regard as much less desirable.
- (c) Insofar as 'expert' studies in the FAO style are likely to be more accessible to and manipulable by businessmen than by villagers, to acquiesce to using them as the basis for decisions is automatically to favour eucalyptus plantations.⁶⁸

The Economization of Land

Like businesses everywhere, eucalyptus corporations tend to feel that official agencies should be doing much more for them. In Thailand, corporations complain that the government is not moving fast enough to pacify trouble-making villagers and streamline concession-granting procedures. Many large companies also agree with the World Bank — and with Thai villagers themselves — that land rights should be granted to more farmers.⁶⁹ Corporate and Bank reasoning, of course, presumably differs from that of many villagers. Officials' attitudes are probably based on the assumption that the sooner land can be bought and sold freely the sooner it will become 'economically productive' and wind up in corporate hands.

The eucalyptus struggle is only one stage of a much longer and larger conflict in rural Thailand between economization on the one hand and livelihood and environment on the other. In this conflict the eucalyptus tree itself may be destined to play only a transitory role. An Australian firm is now working on selecting and cloning native Thai fast-growing trees for future industrial monocrops, and Australian research is also going forward on *Acacia*, *Grevillia* and *Casuarina* species.⁷⁰ Environmentally destructive plantations of native and exotic pines, meanwhile, are increasingly visible in Northern Thailand in watershed areas occupied by hill tribes, as a source of paper pulp and raw materials for Japanese chopsticks.⁷¹ All such biological manipulations, however, are likely to prove over time to be merely technical variations on an underlying economic theme.⁷² And it is local people and their environment who will bear the cost.

Notes and References

1. Heilbroner, R., *The Making of Economic Society*, Prentice-Hall, Englewood Cliffs, 1962, 61-63.
2. The Office for Promotion of Private Forestry Plantations of the Royal Forestry Department (RFD) predicts that 30,000 or more km² may ultimately be planted to the fast-growing Australian tree ('Dan awk paw raw baw plook paa wang yookaa 18 laan rai shell dai kaeng haang maew', *Banthuek Thurakit*, May 15-28, 1989). The National Forestry Policy Committee has set the more ambitious goal of 41,600 km² to be planted by corporations and an additional 20,000 km² to be planted by villagers. ('Joint forest scheme suggests government role', *The Nation*, August 17, 1989.) This is approximately 12 per cent of Thailand's land area and is well over the total figure of land enclosed in England over approximately six centuries. The current figure on eucalyptus cultivation comes from Dr Remgchai Paosaj of the RFD, the figures for 1984 and 1987 from 'Pert pho big turakit

soo kam plook pa cherng panit', *Prachachart turakit*, January 4-6, 1989. Over 50 per cent of eucalyptus planting so far has been on state land ('Kaan perm mool khaa maai khong suan paa maai tow rayo', mimeo, RFD, Bangkok, 1988). Many of the villagers now officially regarded as 'encroaching' on National Reserve Forests were in fact resident there before the areas were gazetted.

3. This is a summary of comments made by villagers for Roi Et, Sri Sa Ket, Kalasin, Surin, Buriram, Yasothorn and Ubon Ratchathane Provinces during a number of seminars, meetings and interviews between November 1987 and August 1989. See Hirsch, P. and Lohmann, L., 'The Contemporary Politics of Environment in Thailand', *Asian Survey*, April 1989, esp. pp. 448-451; for data confirming village reports of scant insect and other wildlife in eucalyptus plantations see Poore, M.E.D. and Fries, C., *The Ecological Effects of Eucalyptus*, FAO, Rome, 1985, 48-49. Confirmation that even paddy-bur:d planting "is detrimental to the current agricultural production systems of some Northeastern agroecosystems" can be found in Craig, I.A., Wasunan, S. and Saenlao, M., 'Effects of Paddy-Bund-Planted Eucalyptus Trees on the Performance of Field Crops', paper presented at Fifth Annual Farming Systems Conference, Kamphaengsaen, April 4-7, 1988. The general Thai village picture of eucalyptus corresponds quite closely to that outlined in Shiva, V. and Bandyopadhyay, J., *Ecological Audit of Eucalyptus Cultivation*, Research Foundation for Science and Ecology, Dehra Dun, 1987, esp. p. 39.

4. Official RFD figures indicate that forest cover stood at about 28 per cent of Thailand's land area in 1988, down from 53 per cent in 1961. This figure is highly unreliable, however, in that it includes rubber plantations, secondary scrub growth, and so on. Independent observers put the figure at about 15 per cent. Some nine per cent of this is in protected areas. Encroachment in National Reserve Forests is, of course, illegal although widespread.

5. Over 77 per cent of Thailand's population will still be living in rural areas in 1990, compared with 87 per cent 25 years ago (World Resources Institute, *World Resources 1988-89*, Basic Books, New York, 1988, 267).

6. For the mid-1970s movements, see Sumatwanit, C. and Morell, D., *Political Conflict in Thailand: Reform, Reaction and Revolution*, Gunn and Hill, Cambridge, MA, 1981.

7. Sukpanich, T., 'NE leaders seek say in reforestation effort', *Bangkok Post*, November 9, 1987; Ekachai, S., 'We want trees of our choice', *Bangkok Post*, March 7, 1988; 'Fiery protest greets Green Esarn Project', *The Nation*, March 17, 1988; 'Villagers destroy nursery in tree protest', *Bangkok Post*, March 17, 1988; 'NE villagers plan own "green project"', *Bangkok Post*, May 31, 1988; Tengpravat, M., 'Villagers in Northeast launch green campaigns' and 'Eucalyptus bonfire to protest against arrests', *Bangkok Post*, June 4, 1988; 'Villagers mark nature event by planting trees', *Bangkok Post*, June 6, 1988; 'Eucalyptus planting sparks fiery protest', *The Nation*, June 14, 1988; Kanjanawanawan, S., 'Eucalyptus protests going straight to the top' and 'Villagers to demand land rights at Cabinet meet', *The Nation*, March 30, 1989; 'Private sector "to blame" for ruined forests', *Bangkok Post*, May 3, 1989; 'Govt urged to give villagers a role in conserving forests', *Bangkok Post*, July 29, 1989; 'Villagers unite to defend forest and own livelihood', *Bangkok Post*, August 1, 1989; etc.

8. A group of villagers living in National Reserve Forests across the country agreed on this set of demands at a government seminar on 'Solving the Problem of Agricultural Land in Forests', held in Bangkok at Government House, August 25-26, 1989.

9. Ekachai, S., 'A battle to save a community forest', 'Standing up to the authorities' and 'Where trees are cut down... to plant trees', *Bangkok Post*, March 7, 1988.

10. *Prachachart Thurakit* gives the figure of two million families "Plook sang suan paa jaak brazil theung thai", September 24-27, 1989.

11. Cited in Doug Fuller, 'Eucalypts fuel the furnace of Brazil's steelworks', *New Scientist*, February 18, 1988, 56.

12. Thai Development Research Institute, *Thailand Natural Resources Profile* TDRI, Bangkok, 1987, 19.

13. Wirawat Dheeraprasart, Royal Forestry Department, personal communication, August 1989.

14. Interview with Wiboon Khemchalerm, Sanam Chai Khet District, Chachoengsao, December 1988; Sukpanich, T., 'Villagers Tell of Forestry's 'scare tactics'', *Bangkok Post*, May 30, 1988.

15. Dhanasettakarn, A., 'Thai-Japanese venture for eucalyptus project', *The Nation*, August, 14, 1989.

16. 'Shell nai songkram see kio', *Poo jatgarn*, November 1988, 50-84; Kuroda, Y., 'Japan's economy — a threat to the global environment', paper presented at the Fourth Biennial Conference on the Fate and Hope of the Earth, June 1989, Managua, Nicaragua.

17. The World Bank has provided several large loans to the provinces, including a \$30 million rural development loan in 1984, a \$27 million regional cities development loan in 1985, and a \$35 million loan to facilitate land tiling in 1984. See Project for Ecological Recovery, 'Trees Don't Grow on Money', *The Nation*, December 9, 1988. Further heavy loans supporting highway improvement, provincial electricity transmission, provincial water supply and rural land development are forthcoming (World Bank, *Monthly Operational Summary of Bank and IDA Proposed Projects*, June 1, 1989; *Status of IBRD/IDA Projects in Execution*, April 30, 1989; and *Thailand: Country Economic Memorandum*, February 21, 1989).

18. World Bank support for rubber replanting has included loans of \$50 million and \$142 million in 1976 and 1982. For more information on environmental problems in Southern Thailand: Mr. Pisit Chansanaw, Raindrop Association, 105-107 Ban Po Road, Tambon Tap Tiang, Amphur Muang, Trang 92000, Thailand.

19. Official estimates put the extent of mangroves in 1988 at 1280 km², but this is disputed by scientists at Chulalongkorn University. As recently as 1975 there were 3127 km² of mangroves in the country ('Country losing mangrove forest land — report', *Bangkok Post*, March 22, 1988). The government body providing special privileges to shrimp farms is the Board of Investment — created with the encouragement of World Bank advisers during an earlier stage of modernization. For a representative dispute over resorts, see '100 villagers take over forest plot of MP's wife', *Bangkok Post*, July 19, 1989; 'Shootout at seized concession forest', *Bangkok Post*, July 20, 1989; 'Villagers come to newsmen's rescue', *Bangkok Post*, July 18, 1989. For environmental conflicts over industrial development in the provinces, see 'The Tantalum Riot: Some Lessons Learned', in Thailand Development Research Institute, *Thailand Natural Resources Profile*, Oxford, Singapore, 1987, 282; and Ekachai, S., 'Pollution Threatening the Livelihood of Farmers', *Bangkok Post*, May 22, 1989.

20. The original motive for planting eucalyptus may thus differ somewhat from that in India, where the "labour displacing potential of Eucalyptus was the first motivating force for large landowners to transfer from foodcrop cultivation to Eucalyptus farming" (Shiva, V., Sharatchandra H.C. and Bandyopadhyay, J., 'Social Forestry — No solution with in the Market', *The Ecologist* 12, 4, 1982, 72. The case of the English enclosures offers an interesting parallel to the Thai case, both in motivation and in effects:

"...one class was undoubtedly a heavy loser by enclosure: the marginal cottagers and smallholders, eking out the produce of their little plots perhaps with wage-labour and certainly with the various petty — but to them crucial — advantages of common rights: pasture for animals and poultry, firewood, building material, timber to repair implements, fences and gates, and so on. Enclosure might well reduce them

to simple wage-labour. More than this: it would transform them and the labourers from upright members of a community, with a distinct set of rights, into inferiors dependent on the rich." (Hobsbawm, E.H., *Industry and Empire*, Weidenfeld and Nicholson, London, 1968, 102.)

Heilbroner, loc. cit., supra 1, adds that, "the enclosure process provided a powerful force for the... formation of the new relationships of a market society. By dispossessing the peasant, it 'created' a new kind of labour force — landless, without traditional sources of income, however meagre, impelled to find work for wages wherever it might be available". Such work was often not available, of course. For more discussion of the social effects of eucalyptus in India, see Shiva et al, op. cit., 158-168; and Lamb, H. and Percy, S., 'Indians fight eucalyptus plantations on commons', *New Scientist*, July 16, 1987. Sachs, W., 'The Gospel of Global Efficiency', *The Ecologist* 19, 3, 1989, is a useful discussion of the modern notion of 'resources' and how it conflicts with more traditional concepts.

21. 'Ootasahagam yuea lae kradaat', *Warasarn settakit grungthep* 21, 6, June 1989, 328-333.

22. Letter from Danai Ketsiri, Governor of Ubon Ratchathane Province, to Indo-Thai Pulp Co., Ltd., April 28, 1989.

23. 'Ootasahagam yuea lae kradaat', loc. cit., supra 21.

24. Goldstein, C., 'Not just paper profits', *Far Eastern Economic Review*, September 15, 1988, 95-97; Dhanasettakarn, op. cit., supra 15. A consortium of ten Japanese companies and the Japanese Government are also reportedly funding the construction of a harbour at Sattahip to facilitate the export of eucalyptus from eastern Thailand (Martin Khor, Third World Network, Panang, Malaysia, personal communication, July 21, 1989).

25. Local Development Institute, 'Paa Choom Chone: miti nayobaai jaak chaaw baan', mimeo, Bangkok, August 1989, 2.

26. Pholcheewin, C., 'Karn plook paa phuea ootasahagm taw nueang: yuea kradaat', contribution to Seminar on 'People and Forests: The Current Situation, Problems, and the Future', Chulalongkorn University Social Research Institute, Bangkok, September 8-9, 1988.

27. 'Shell tests reaction to eucalyptus project', *Bangkok Post*, April 18, 1988; Supanich, T., 'Villagers tell of forestry's "scare tactics"', *Bangkok Post*, May 30, 1988. Compare Hill, C., *Reformation to Industrial Revolution* Penguin, New York, 1969, 271: "Many small owners were bought out before enclosure, to facilitate it. Whether as cause or consequence of enclosure, such village self-government as existed in England disappeared."

28. Appropriate Technology Association, 'Wipaak kronggarn sampatahn plook paa pahn lahn kong shell', *Teekooloyee tee maw soam* 7, 2, 1988, 22-39; 'Shell nai songkram see kio', *Poo jatgarn*, November 1988, 50-84.

29. *Tharn Settakit*, February 15-20, 1988.

30. Appropriate Technology Association, 'Bee oh ai brake kronggarn plook yookaalipat', information sheet, 1988.

31. Nock, H.P., 'Das Brasilianische Aufforstungsprogramm', in *Forestarchiv* 4, 1981, 151.

32. Manfred van Eyk, interview with Thamrong Tayangkanon, Shell (Thailand), April 1989.

33. *Bangkok Post*, March 7, 1988; Wirawat Teeraprasart, personal communication, December 1988. In Brazil there is the precedent of the Aracruz firm, which has engaged in unauthorized clearance of primary rainforest in order to round out its plantations (Magda Renner, Acao Democratica Feminina Gaucha and Amigos da Terra Brazil, personal communication, September 1, 1989; Muller-Plantenburg, C., *Indianergemiete und Grossprojekte in Brasilien*; Augusto Ruschi's comments on Aracruz Florestal S.A.'s Espirito Santo eucalyptus plantations in *Boletim do Museu de Biologia*, Espirito Santo, Brazil, 1976, 28).

34. Agricultural Statistics Center, Office of Agricultural Economy, *Paa Khun Son* Ministry of Ag-

- riculture and Cooperatives, Bangkok, May 1984; Koy Thompson, personal communication, January 9, 1989.
35. Manfred van Eyk, supra 32.
36. Usher, A.D. 'Wonder Tree or Ecological Menace?', *The Nation*, February 8, 1989.
37. Appropriate Technology Association, op. cit., supra 28, 36.
38. Ibid, 32.
39. Poore and Fries, op. cit., supra 3, 19-21. Rainfall in the area slated for plantations is relatively high, ranging from 1600 to 2000 mm yearly (Thai Development Research Institute, op. cit., supra 12, 48). Ironically, one impression often given in Japan of eucalyptus cultivation is that it will help prevent floods such as those of November 1988 from recurring (Wakako Hironaka, personal communication, September 1989).
40. Appropriate Technology Association, op. cit., supra 28, 35. Despite claims by government and business that eucalyptus will only be planted on soil too poor to support other crops, the Chanthaburi site's soils are suitable not only for fruit trees but for a range of other crops. Cf. Ruschi, op. cit., supra 33, speaking of the Aracruz Florestal plantations in Espirito Santo: "these soils (used for eucalyptus) are the best tillable soils... which could be used for cereal cultures instead of eucalypti".
41. Usher, op. cit., supra 36.
42. Ibid; Renner, loc. cit., supra 33; Ruschi, op. cit., supra 33; Poore and Fries, op. cit., supra 3, 50. Compared to eucalyptus, even other monocrops such as rubber (another exotic) and coconut support considerable wildlife. According to the Conservation Data Center of Mahidol University in Bangkok, 44 bird and 13 mammal species can be expected in rubber plantations, and 39 bird and 12 mammal species in coconut groves. No comparable figures on eucalyptus are available, but Buriram villagers say that "no birds come to rest" in eucalyptus plantations and that "not even red ants" can be found there.
43. Renner, loc. cit., supra 33; Ruschi, op. cit., supra 33; Muller-Plantenberg, op. cit., supra 33; Nock, op. cit., supra 31; Lutzenberger, J., 'Reflorestamento e Ecologia'.
44. The assumption that only massive capital investment by large organizations can succeed in reforesting Thailand is also visible in the writings of the RFD's Dr Rengchai, who says that reforesting 12 per cent of the country would require US\$280 to \$320 million in addition to a "large number" of officials. The conclusion meant to be drawn, of course, is that since the government cannot commit such amounts, reforestation must be left to the business sector ('Naew tahng gam paa maai kong thai', seminar paper prepared for the Thai government's seminar on forestry and land issues August 25-26, 1989, 1).
45. In north Thailand, there are carefully-protected community catchment forests providing traditional rice irrigation systems with water, funeral forests for burial of ancestors, commons forests providing useful forest products on a sustainable basis, and 'buffer' forests shielding minority-group villages from surprise military attack. In the Northeast villagers have deliberately regrown and preserved 'supermarket' forests — without expensive investment in purchased seeds — where they can find mushrooms, small game, honey, resins, fruit, firewood, fodder, herbal medicines, frogs, edible insects etc.; and 'grandfather forests' housing spirits of place. Along the coasts, villagers have been managing mangroves sustainably for decades in order to ensure supplies of fish, firewood, medicines etc. And in both the North and Northeast there is increasing interest in tree intercropping to ensure soil fertility and protection against erosion. See Lohmann, L., 'Thailand Forest Struggles: A View from the Villages', *Asian Action* 69, July-September, 1988, 5-6; NGO Coordinating Committee on Rural Development, *Panhaa paa maai thii tham kin lae thaang awk*, proceedings of a seminar in Bangkok, July 28-29, 1989.
46. *Thai Rath*, April 10 and 13, 1988; *Matichon*, May 22, 1988.
47. *Matichon*, December 20, 1987, February 6, 1988, and February 9, 1988; *Krungthem Turakit*, December 15, 1987; 'Tuean Chaaw jan khut hai luek gawn kaai tee din borisat yai', *Settakit*, February 11, 1988.
48. Usher, op. cit., supra 36.
49. A Chachoengsao province forestry official named Chatchai Umprai has come up with oft-cited figures showing that eucalyptus out-performs rice, sugar cane, maize (corn), soybeans and cassava in income per acre per year (see Tingsabadh, Dr J., 'Kon kap paa maai: phaap ruam haeng panhaa', from the seminar proceedings referred to supra 8). Eucalyptus is held to be especially economic on degraded land, but companies, naturally enough, are more interested in sites with fertile soil.
50. Shell, for example, claims that on an initial five-year investment of US\$48 million, its plantations will earn an annual \$72 million in export income beginning in the sixth year (*Matichon*, December 14, 1987).
51. One typical title is *We Love the Forest: We Know to Love It, We Know to Preserve It; Forest together with Thailand for All time*, a pair of booklets containing reprints of 12 pro-eucalyptus plantation articles by Dr Rengchai of the RFD for the daily newspaper *Naew Naa* (mimeo, Bangkok, 1989). Refashioning the concept of nature conservation to bring it into line with business interests, of course, is a process which is going forward worldwide under the rubric of 'reforestation for high returns' 'biodiversity for biotechnology', 'tropical forests for tourists', and 'pollution control for profits'. A more sophisticated champion of this trend (which in the 1990s will bid to supplant both intellectual and vernacular concepts of environmental responsibility) is the World Resources Institute, with its various programs to "harness greed" (the expression is that of WRI's Frederick von Bolhuis) in the service of ecology and simultaneously to translate environmentalists' concerns to the service of the global economy. Many Third World villagers, for their part, are shrewdly attempting to weave Western concepts of environmentalism into their media campaigns to protect local and traditional livelihoods. (More than one village group in Thailand fighting logging or eucalyptus plantations or setting up a community forest, for example, has appropriated to itself the decidedly nonvernacular title of *Chomeroome anurak thamma-chart* (Nature Conservation Club).) These games of ideological peek-a-boo, however, cannot conceal the fact that the intellectual, business, and village approaches to nature are rooted in three utterly different social formations and are likely to issue in three completely different types of action.
52. Hirsch, P., 'Deforestation and Development in Thailand', *Singapore Journal of Tropical Geography* 8, 2, 1987, 130-138; Project for Ecological Recovery and Friedrich Naumann Foundation, 'Panhaa paa maai kap thaang awk khong chaaw baan', Proceedings of a seminar at Cha-Am, March 17-19, 1989, mimeo, Bangkok, 1989; and NGO Coordinating Committee on Rural Development, 'Panhaa paa maai thii tham kin lae thaang awk', Proceedings of a seminar at Chulalongkorn University in Bangkok, July 28-29, 1989, mimeo, Bangkok, 1989.
53. Nectoux, F. and Kuroda, Y., *Timber from the South Seas*, WWF International, Gland, 1989, 123; Japan International Cooperation Agency, *Annual Reports*, 1985, 45; 1986, 56; 1987, 57.
54. 'Aid sought from Japan for Green Northeast plan', *Bangkok Post*, September 2, 1989. The British engineering firm Biwater published a seven-volume study for the *isan khio* project in 1987.
55. FAO, World Bank, World Resources Institute and United Nations Development Programme, *The Tropical Forestry Action Plan*, FAO, Rome, 1987, esp. p. 32; Vandana Shiva, *Forestry Crisis and Forestry Myths*, World Rainforest Movement, Penang, 1987; FAO, *Forestry Action Plan for Latin America and the Caribbean: Executive Summary*, FAO, Rome, 1988.
56. The Coordinator, Tropical Forestry Action Plan, FAO, *TFAP Update No. 12*, FAO, Rome, December 30, 1988; Asian Development Bank, 'Sector Paper on Forestry' ADB, Manila, February 1989.
57. Jaakko Poyry has served at least 40 forest-industry projects in Brazil, including the Jari complex; various logging operations in the Amazon; pulp mills; plantations run by Shell and other companies; and schemes to use tropical forests to fuel aluminium refining and wood gasifier projects. It is consultant to the Aracruz eucalyptus operations in Brazil currently being held up as a model for Thailand ('Sia kitti (soon hua seng) sang lui', *Prachachart turakit*, August 31-September 2, 1989). It has worked with PICOP in the Philippines; PT Indorayon and transmigrasi officials in Indonesia; the Wesley Vale project in Australia; government logging operations in Malaysia; and eucalyptus and pulp companies in Burma, Thailand, Vietnam, Chile, the US and dozens of other countries (*Jaakko Poyry Projects* Jaakko Poyry, Helsinki, November 1988; *Know-How Wire* (Jaakko Poyry client magazine), January 1989). Its Forestry Master Plan for Sri Lanka has drawn vociferous criticism from conservationists and villagers as scientifically bankrupt and having a "preponderant tilt towards the production of commercial timber at the expense of long-term ecological concerns and the satisfaction of traditional needs of the local people that have hitherto been met from the yield of indigenous forest products" (Manuel Tampoe, 'People's Participation in Forestry Activities under the Forestry Master Plan', in Fernando, R. and Samarasinghe, S.W. R. de A. (eds.), *Forest Conservation and the Forestry Master Plan for Sri Lanka — A Review* (Second Edition), Wildlife and Nature Protection Society of Sri Lanka, Colombo, 1989, 87). Portuguese plantation projects on which Jaakko Poyry has advised, meanwhile, have provoked violent protests from local peasants (Jill Joliffe, 'Greens and farmers fight the eucalyptus tree', *The Guardian*, June 22, 1989.)
58. 'Master Plan for Forestry Development in Thailand', mimeo, n.d.
59. *Jaakko Poyry in Brief*, Jaakko Poyry, Helsinki, n.d.
60. Paosaj, R., *Raw rak paa maai*; statement of Royal Dutch Shell's Preecha Phonprasaert in 'Eucalyptus project faces stiff opposition', *Bangkok Post*, December 28, 1987.
61. Poore and Fries, op. cit., supra 3, 1 and 84; Davidson, J., 'Setting Aside the Idea that Eucalypts Are Always Bad', FAO, Rome, 1985.
62. Poore and Fries, op. cit., supra 3, 1.
63. Ibid, 1-3.
64. FAO, *The Eucalypt Dilemma*, FAO, Rome, 1989, 2 and 26; Poore and Fries, op. cit., supra 3, 3 and 55.
65. Davidson, op. cit., supra 44, 11-12.
66. Shiva and Bandyopadhyay, op. cit., supra 3, 32-42.
67. Davidson, op. cit., supra 44, 20.
68. FAO studies are (quite without grounds) mentioned constantly by Shell and RFD bureaucrats as supporting the case for large plantations in Thailand, generally in a context in which the audience has not read them and cannot contest the issue.
69. From statements of Shell representatives at the government seminar cited in note 8.
70. The company is ACOA (Treetech branch). P.L. Simmons, Adelaide, Australia, personal communication, August, 1989; Patrick Anderson, Rainforest Information Centre, Lismore, Australia, personal communication, August 9, 1989.
71. Dr Leo Alting von Geusau, Chiang Rai, personal communication, February 1989.
72. Villagers at Siew village in Sri Sa Ket have stated that they would object to any species of tree that displaced the community forest that guarantees their livelihood (interview, February 1988).

The Ecology of Sustainable Development

by
William E. Rees

As the term 'sustainable development' has been embraced by the political mainstream, so it has been stripped of its original concern with ensuring future ecological stability. It is no longer a challenge to the conventional economic paradigm but rather has become another excuse for continued economic growth. True sustainability demands a radically different economics which fully recognizes the processes and limits of the biosphere.

Since being popularized by the Report of the World Commission on Environment and Development ('The Brundtland Report'),¹ the concept of 'sustainable development' has inspired the enthusiasm of people on all sides of the economy-environment debate. To some, sustainable development is a long-awaited call for political recognition of global environmental decay, economic injustice, and limits to material growth. It therefore represents an opportunity for humanity to correct an historical error and develop a gentler, more balanced, and stable relationship with the natural world.² This view of sustainable development also raises moral considerations such as the need in a limited world for a more equitable sharing of the world's resources.³

But other people read a different message in *Our Common Future*. The World Commission itself equates sustainable development with "more rapid economic growth in both industrial and developing countries" on the grounds that "economic growth and diversification... will help developing countries mitigate the strains on the rural environment, raise productivity and consumption standards, and allow nations to move beyond dependence on one or two primary products for their export earnings."⁴ Accordingly, the Commission indicates that "a five- to ten-fold increase in world industrial output can be anticipated by the time world population stabilizes some time in the next century."⁵

To those who regard present levels of industrial activity as the root cause of global environmental decline, the Commission's appeal for a "revitalization" of economic growth on this scale seems paradoxical at best. Nevertheless, the power of the

growth paradigm is not to be underestimated. As sustainable development is gradually embraced by the political mainstream, its meaning drifts ever further from the ideal of ensuring a sustainable environment toward the seductive temptation of ensuring sustainable material growth.

The Cultural Roots of Reality

A society's understanding of 'reality' is profoundly affected by an elaborate set of unconscious 'facts', unquestioned assumptions, and entrenched beliefs. These are derived ultimately from the shared experience of a people in the course of their social evolution and are transmitted culturally to each new individual as she or he matures in that particular milieu. Such a common philosophy or world-view shapes every culture's social relationships, its political institutions, and the nature of its economic enterprise.

The scientific or Cartesian world-view that presently dominates western society is characterized by a mechanical view of the universe as "a vast machine, wound up by God to tick forever, and consisting of two basic entities: matter and motion".⁶

Modern economics owes much to this scientific world-view. The founders of the neo-classical school, impressed with the spectacular successes of Newtonian physics, strove to create economics as a sister science; "the mechanics of utility and self-interest".⁷ Consequently there is now an entrenched view of the economic process as "a self-sustaining circular flow between production and consumption within a completely closed system." By this perception, supply and demand functions continually re-adjust to each other, "everything... turns out to be just a pendulum movement. One business 'cycle' follows another... If events alter the supp-

ly and demand propensities, the economic world returns to its previous position as soon as these events fade out." In short, "complete reversibility is the general rule, just as in mechanics".⁸

A mechanical economy operating in an infinite universe raises the theoretical possibility of unlimited growth. Economic planners seem to believe "not only in the possibility of continuous material growth, but in its axiomatic necessity".^{9,10} Accordingly, the annual increase in gross national product (GNP) is still taken as the primary indicator of national health. Rates under 3 per cent are considered sluggish but even 3 per cent implies a doubling of economic activity in just 23 years.

It is important to note in the context of sustainable development that capitalist states depend on the expansion of their national economies to ensure that the poor receive enough of the national income to survive. Indeed, economic growth is a major instrument of social policy. By sustaining hope for improvement, it relieves the pressure for policies aimed at more equitable distribution of wealth.

Ecological Reality

The emerging ecological crisis reveals fatal flaws in the prevailing world-view. Our mechanical perception of the biosphere is dangerously superficial and our continuing belief in the possibility of sustainable development based on the growth-oriented assumptions of neo-classical economics is illusory. "No amount of ethical axiology, or legal, policy and technological engineering is going to solve problems that are misunderstood."¹¹ It follows that significant changes in sociocultural beliefs, attitudes, and behaviour will be required before sustainable development acquires substantive meaning.¹²

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From Environment to Biosphere

If we are to gain a proper understanding of the relationship between economy and environment, it is vital to recognize that the objectification of the natural world is an artifact of the Cartesian subject-object dualism. In effect, the concept of the environment as a 'separate entity' is a human invention.

The psychological consequences of this invention are quite profound. By definition, 'environment' is its own pejorative, alluding to whatever surrounds some other thing of greater interest or value. Environment "diffidently declares itself to be peripheral, unimportant, not to be taken seriously".¹³ We may recognize the environment as a source of resources and a sink for wastes, but beyond that the natural world is perceived as a mere static backdrop to human affairs. By this perception, the impacts of economic activity on environmental processes are perceived to be of little long-term consequence. Should something go wrong, a simple retraction or technological fix will set things right.

The reality is, of course, that the economy and the environment have always been fully and inextricably integrated everywhere but in the Cartesian mind. For all its political and institutional sophistication, the human economy is "fundamentally directed toward a problem encountered by all other species — the dependence for life on materials from elsewhere in the biosphere".¹⁴ Functionally speaking there is only a single entity, the biosphere, and humanity has always been part of it.

The Thermodynamics of Growth

The mechanical metaphor has inhibited economic theory from acknowledging the Second Law of Thermodynamics. This omission is at the heart of our ecological crisis. The Second Law states that in any closed isolated system, available energy and matter are continuously and irrevocably degraded to the unavailable state.¹⁵ Since the global economy operates within an essentially closed system, the Second Law (the entropy law) is actually the ultimate regulator of economic activity.

All modern economies are dependent on fixed stocks of non-renewable material and energy resources. The Second Law therefore declares that they necessarily



In thermodynamic terms all material economic production is in fact consumption and contributes to increasing global entropy.

consume and degrade the very resource base which sustains them. Our material economies treat other components of the biosphere as resources and all the products of economic activity (that is both the by-products of manufacturing and the final consumer goods) are eventually returned to the biosphere as waste. Thus, while we like to think of our economies as dynamic, productive systems, the Second Law states that in thermodynamic terms, all material economic 'production' is in fact 'consumption'. Any form of economic activity dependent on material resources therefore contributes to a constant increase in global net entropy (disorder), through the continuous dissipation of available energy and matter.¹⁶ It follows that contrary to the assumptions of neoclassical theory:

- There is no equilibrium in the energy and material relationships between industrial economies and the biosphere;
- Sustainable development based on prevailing patterns of resource use is not even theoretically conceivable.

The thermodynamic interpretation of the economic process therefore suggests a new definition of sustainable development which contrasts radically with present practice: sustainable development is development that minimizes resource use and the increase in global entropy.

The Special Case of Ecosystems

Ecosystems, like economic systems, depend on fixed stocks of material resources. However, the components of ecosystems are constantly being transformed and recycled throughout the system via food-webs at the local level, and biogeochemical cycles on a global scale. In addition, evolution and succession in natural communities tend toward greater net order and resilience.

The material transformations and developmental trends of ecosystems thus appear at first glance to defy the entropy law. Ecosystems are inherently self-sustaining and self-organizing, and therefore contribute to a reduction in global net entropy. The organizational property by which living systems continuously produce themselves is known as *autopoiesis*.¹⁷ Autopoiesis is a product of the complex, interdependent relationships and flows linking the major components of the biosphere. The structural integrity of these relationships is therefore essential for the production and maintenance of the participating components themselves.

Autopoiesis is related to the homeostatic behaviour of the biosphere. Over geological time, life processes have regulated the physical environment of Earth so as to maintain conditions favourable for life.¹⁸ As a self-producing self-regulating system, the biosphere as a whole exhibits an important property of ecosystem dynamics: through numerous positive and negative feedback mechanisms " ...[the system] is in many respects self-generating — its productivity and stability determined largely through its internal interactions".¹⁹

Autopoiesis is possible only because ecosystems, unlike economic systems, are driven by an external source of free energy — the sun. The steady stream of solar energy sustains essentially all biological activity and makes possible the diversity of life on earth. Through photosynthesis, living systems concentrate simple dispersed chemicals and use them to synthesize the most complex substances known.²⁰ Thus, in contrast to economic systems, ecosystems steadily contribute to the accumulation of concentrated energy, matter, and order within the biosphere. In thermodynamic terms, photosynthesis is the most important materially productive process on the planet and it is the ultimate source of all renewable resources used by the human economy. Moreover, since the flow of solar radiation is constant, steady and reliable, resource production in the

ecological sector is potentially sustainable over any time scale relevant to human-kind. Ecological productivity is limited, however, by the availability of nutrients, photosynthetic efficiency, and ultimately the rate of energy input (the 'solar flux') itself. Ecosystems therefore do not grow indefinitely. Unlike the economy, which expands through resource conversion and positive feedback, ecosystems are held in 'steady-state' or dynamic equilibrium by limiting factors and negative feedback.²¹

The Pathology of Economy-Environment Relationships

The distinction between ecosystem equilibrium and economic growth is significant because human beings and their economies are now a dominant component of all the world's major ecosystems. Since our economies are growing and the ecosystems within which they are embedded are not, the consumption of ecological resources everywhere has begun to exceed sustainable rates of biological production. Nearly 40 per cent of terrestrial net primary productivity (photosynthesis) is already being used or co-opted by humans, one species among millions, and the fraction is steadily increasing.²²

Over-harvesting, including species extinctions and the outright destruction of whole ecosystems, may eventually undermine the autopoietic organization of the biosphere and therefore its ability to produce the type of 'environment' necessary to sustain human beings. Moreover, the

destabilizing effect of over-exploitation is exacerbated by pollution which impairs the remaining productivity of ecosystems.

Unfortunately, modern economics is uninformed by autopoiesis and has all but ignored the major 'downstream' consequences of pollution.²³ Society therefore receives few signals from the marketplace that the very basis of our wealth is being permanently eroded. At present, markets do not even recognize such factors as nutrient recycling, soil building, atmosphere maintenance, and climate stabilization as resources. Thus, while market economics can usually price the scarce material inputs to manufacturing, it is virtually silent on the value of biosphere processes. Not surprisingly, it is these more critical process resources that are becoming increasingly scarce *and there are no substitutes*.

Consuming the Capital

Clearly, any human activity dependent on the consumptive use of ecological resources (forestry, fisheries, agriculture, waste disposal, urban sprawl onto agricultural land) cannot be sustained indefinitely if it uses not only the annual production of the biosphere (the 'interest') but also cuts into the standing stock (the 'capital'). Herein lies the essence of our environmental crisis. Persistent trends in key ecological variables indicate that we have not only been living off the interest but also consuming our ecological capital. This is the inevitable consequence of exponential material growth in a finite environment.

Viewing the decline of the biosphere in the same light as rising standards of living provides a novel perspective on at least one source of our unprecedented wealth. The intersecting curves reveal that throughout the industrial revolution we have been busily converting ecological capital into economic capital. In short, the global economy is cannibalizing the biosphere.

This means that much of our wealth is illusion. We have simply drawn down one account (the biosphere) to add to another (material wealth). It might even be argued that we have been collectively impoverished in the process. Much potentially renewable ecological capital has been permanently converted into machinery, plant and possessions that will eventually wear out and have to be replaced at the cost of additional resources.²⁴

Heilbroner has noted that the origin of surplus in the era of industrial capitalism "has gradually moved from trade through direct wage labour exploitation toward technological rents, and that modern-day profits consist of combinations of all three."²⁵ We can now add a fourth profit source to Heilbroner's list; the irreversible conversion of biological resources. (We should note that the form of state capitalism practised in socialist countries differs little in its ecological effect from the industrial capitalism of Western market economies).

Human Carrying Capacity

For most species, carrying capacity is the maximum population that can be supported indefinitely in a given habitat without permanently damaging the ecosystem. For human society, carrying capacity can be defined as the maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a defined planning region without progressively impairing ecological productivity and integrity.²⁶ The corresponding maximum human population is therefore a function of per capita rates of resource consumption and waste production (system capacity divided by per capita demand).

The deteriorating biosphere suggests that human populations and the present scale of economic activity may already exceed global carrying capacity. Many ecological processes have been over-loaded and the long-term dependability of certain critical functions is in jeopardy. Indeed,

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"True sustainability requires that we recognize the reality of ecological limits to material growth."

we may not be far from absolute limits.

Through a thermodynamic analysis of food production, Bryson has estimated that about 900 square metres of cropland are required to produce the average per capita food energy requirements assuming year round cropping.²⁷ With an average growing season of only 180 days, each hectare of agricultural land will theoretically support about five-and-a-half people. The present world population density is about three persons per arable hectare. Hence we are within one population doubling of the 'sunshine limit' to growth and at present rates will reach that limit in 35 years.²⁸

These calculations make no allowance for either resource degradation or technological advances. While such uncertainties make predictions about food limits hazardous, per capita grain production has declined each year since 1984;²⁹ available data on erosion and falling water tables suggest "sustainable world food output is now running well below consumption",³⁰ and "the backlog of unused agricultural technologies that farmers can draw on in some countries is dwindling".³¹

Another factor to consider is that the closer we push the biosphere to its limits, the more likely we are to reach critical thresholds of unpredictable systems behaviour. Humankind cannot risk the destabilization of major biophysical systems from which there would be no recovery in the short term (for example, large shifts in historic patterns of climate). From the perspective of carrying capacity, persistent negative ecological trends are clear signals that the present human population and level of economic activity already threaten to disrupt the very processes and relationships which sustain us.

It should be understood that while human society depends on many ecological resources and functions for survival, carrying capacity is ultimately determined by the single vital resource or function in least supply. (On the global scale, loss of the ozone layer alone could conceivably lead to the extinction of the human species.)

Such considerations call seriously to question the Brundtland Commission's route to sustainable development through a five- to ten-fold increase in industrial ac-

tivity. Indeed, it forces a reconsideration of the entire material growth ethic, the central pillar of industrial society.

Sustainability in the Real World: Living on the Interest

This analysis of the present pathological relationship between environment and economy and the implications of carrying capacity for future development, represents a serious challenge to the central assumptions of our economy and to our present way of life. True sustainability requires that we recognize the reality of ecological limits to material growth and the need to live on the interest of our remaining ecological capital. Assuming that our will to survive can overcome our natural resistance to change, society must soon come to accept the following principles as guidelines on the road to sustainable development.

- The economy is an integral component of the biosphere. The future of society is therefore wholly dependent on our ability to restore and maintain the self-producing structure and functional relationships of the biosphere (autopoiesis).
- The maximum sustainable level of global material economic activity is limited and depends on the condition of the biosphere. Exceeding current limits will reduce future potential in proportion to the damage done to biospheric productivity.
- We must move from a society oriented to satisfying the artificial wants of a few to one committed to satisfying the basic needs of all. Our present economic system encourages growth in consumption. By contrast, sustainable development requires that we minimize resource throughput and the increase in global net entropy.
- Harvest rates in the renewable resource sectors must be limited to average rates of production and not be responsive to ever-increasing market demand. Bottom line economics encourages the liquidation of ecological capital stock (fish, forests, soil, etc.). By contrast, sustainable development requires that society lives on the 'interest' of our

ecological endowment. This is not an option but an absolute necessity if we are to have a sustainable future.

- Rates of waste discharge must be limited to the rate at which ecosystems can absorb and degrade the wastes. Significant processing capacity generally exists only for ecologically-benign organic waste and nutrients.
- In the case of carcinogens and similar dangerous compounds zero tolerance is warranted.
- Society at large will have to pay the true costs of goods 'production'. In general, market prices should reflect producers' costs for ecosystems maintenance (e.g., soils management). In other cases, an entropy tax should be imposed to provide public funds for common property systems maintenance. (An entropy tax on fossil fuels could be used to plant carbon sink forests to help stabilize atmospheric CO₂ levels).³² Where serious damage has already been done, society may have to devote substantial resources to ecosystems rehabilitation. All this implies significant increases in operating costs and market prices.
- As society makes the above adjustments, special measures must be put in place to ensure that the burden does not fall unfairly on the poor. The basic necessities for a decent life must be affordable to all.
- We must recognize that historic levels of profits may not be compatible with sustainable development. Resource corporations should be required to demonstrate adequate maintenance of the resource base before declaring a dividend.
- Global population control must become an international priority. The maximum sustainable human population (global carrying capacity) is a function of the nature of economic activity, technological sophistication and mean per capita consumption (material standard of living). All these factors are subject to public policy adjustment. Any population growth beyond the current carrying capacity can only be justified by improved technology or be accompanied by a proportional decline in living standards.

- New systems of national economic-ecological accounts must be adopted to monitor the biosphere.³³ Remarkably, macro-economic indicators such as GNP only monitor income flows, not the state of productive capital. Thus, "glowing economic reports... are possible when the policies that generate them are destroying the resource base".³⁴
- The new indicators might include Adjusted National Product (ANP), "consisting of GNP with the social and environmental costs deducted from it, rather than added to it".³⁵ Other accounts should monitor the state of biologically productive assets and key autopoietic processes such as pollution absorption, nutrient cycling, soils maintenance, radiation balance, atmospheric regulation, and primary production (photosynthesis).³⁶
- In the absence of such accounts, inter-regional trade obscures people's perception of their obligate dependency on the biosphere. Importing ecological goods and services means importing carrying capacity from elsewhere and encourages people to destroy their own local ecosystems through 'development' at no apparent cost to themselves. Many regions and nations with excellent economic accounts (for example, Japan) would probably be unviable as isolated ecological units.
- Sustainable development requires monitoring cumulative impacts and defining development regions for ecological accounting purposes. In current practice 'taking environmental factors into account' usually means that long-term ecological productivity is 'traded-off' for short-term economic gain. Thus, while individual developments are approved on economic grounds, the cumulative ecological impacts will eventually exceed regional (and global) carrying capacity.
- Seemingly under-developed ecological assets in one region may actually be performing vital functions that are already being fully utilized by people elsewhere. This is most evident when there are markets for specific products but is less obvious in the case of unaccounted vital services.
- Trade also has important implications for equity in achieving global sustainable development. For example, wealthy nations may import non-surplus carrying capacity from poor regions at great unaccounted

costs to the latter. This is the case when the global financial system compels developing nations to grow cash crops for export on their best lands at the expense of local staples production. This leads in turn to over-exploitation of marginal agricultural and forest lands as impoverished local people struggle to survive. Revised inter-regional economic-ecological accounting would help to internalize these real cost factors into the terms of trade.

- When the carrying capacity of a given management region has been reached, ecological factors must necessarily over-ride economic considerations. The next project cannot be built. (If each nation or management region achieves regional ecological stability, the net effect would be global stability. Conversely, if most regions exceed their carrying capacities, global destruction is assured).
- Well-documented ecological trends such as atmospheric change, forest die-back and falling per capita food production, indicate that we have already breached global carrying capacity. Thus, even current levels of economic activity are not sustainable with present technology. Unless benign alternatives are found, people in the industrialized countries may well have to lower their material expectations and even accept a decline in standards to achieve global sustainability.
- Economic growth should no longer be considered a basic element of social policy. Social justice and equity considerations may therefore require creative new policies for income redistribution. We may even have to move beyond paid employment as the means of access to the basic requirements of life to some other system of entitlement.
- Sustainable development will require significant restructuring of national economies in the developed nations (for example in the petroleum, automotive, and forestry sectors). This in turn may require new forms of social safety nets to catch and retrain workers displaced from ecologically unsustainable employment.
- Sustainable development re-introduces equity and moral considerations into global economic development. The wealthiest 26 per cent of the world's population consume 80-86 per cent of non-renewable resources and 34-50 per cent of food supplies.³⁷ In a limited world, reducing

the gap in living standards between the rich and the poor requires that any capacity for future material economic growth be redirected to the Third World. Forgiving international debt, aid to rehabilitate tropical ecosystems, and programmes to develop ecologically appropriate technology for the developing countries, are examples of strategies the developed nations might implement to help redistribute global wealth.

- Sustainable development represents an opportunity to shift the emphasis in development from quantitative to qualitative considerations. We might rediscover that development has more to do with community relationship, self-reliance and personal growth than it does with increased economic capacity.
- Socially sensitive interpretations of sustainable development emphasize the opportunity for a return to community values, local control over resources, community-based development and other forms of decentralized government. This too confronts the current trends toward concentrated economic power and centralized political decision-making.
- Global sustainable development demands the development of new forms of international cooperation and regulation to ensure acceptable standards for ecological stability. This is contrary to the current emphasis on competition, exploitation of comparative advantage and deregulation as means to stimulate world economic growth.
- Sustainable development presents an opportunity to eliminate the arms race and free up the resources required for planetary rehabilitation. Armaments presently consume a trillion dollars or "more than the total income of the poorest half of humanity".³⁸

Conclusion: Difficult Path to a Better World

Most discussion of sustainable development in the socio-political mainstream emphasizes the need to sustain economic growth and assumes that we can 'account for' the environment through greater efficiency of resource use, improved technology, better pollution control and wider use of environmental assessment. Such incrementalism may constitute a necessary first step but by itself would result in little

more than a somewhat better dressed version of the growth-bound status quo requiring a minimum of adjustment by either industry or individuals.

The evidence suggests, however, that we may be fast approaching absolute limits to material economic growth. We no longer have the luxury of 'trading-off' ecological damage for economic benefits if we hope to have a sustainable future. The maintenance of global ecological integrity necessarily becomes our highest priority and must be taken account of in every local and regional development decision.

While the conceptual framework of this paper merely stresses the obvious — a dependent part cannot grow indefinitely within a limited whole — the implications of accepting this truism imply a profound shift in societal values and attitudes, and a significant restructuring of national and global economies. On the positive side, the attitudinal changes and policy responses suggested have the potential to produce a more politically secure, ecologically stable and economically just global society.

Those who argue that this interpretation is extreme and the suggested guidelines for sustainable development are utopian (or draconian, depending on your point of view) have an obligation to refute the analysis. If the basic argument is sound, the real utopians — dreamers of the impossible — are those who still support the material growth ethic and maintenance of our economic status quo.

This is an edited version of 'The Ecological Meaning of Environment-Economy Integration' prepared for the Ninth Commonwealth Conference on Human Ecology, held at the University of Edinburgh, 19-23 July 1989.

References and Notes

1. World Commission on Environment and Development (WCED), *Our Common Future*, Oxford University Press, 1987.
2. For an example see Robertson, J., *The Sane Alternative*, River Basin Publishing, St. Paul, Minnesota, 1978.
3. Kneen, B., 'The Contradiction of Sustainable Development', *Canadian Dimension* 23, 1, 1989.
4. WCED, op. cit., supra 1, 89.
5. Ibid, 213.
6. Berman, M., *The Reenchantment of the World*, Bantam Books, New York, 1984, 21. (Also Cornell University Press, 1981).
7. Jevons, W., *The Theory of Political Economy* (2nd ed), London, Macmillan, 1879, cited in Georgescu-Roegen, N., 'Energy and Economic Myths', *Southern Economic Journal* 41, 3, 1975, 347-381.
8. Georgescu-Roegen, *ibid*, 348, emphasis added.
9. Georgescu-Roegen, N., 'The Steady-State and Ecological Salvation: A Thermodynamic Analysis',

LANCASTER UNIVERSITY

M.A. IN VALUES and the ENVIRONMENT

The Department of Philosophy announces a new modular programme of full-time or part-time study dealing with the concepts and values central to an appreciation of the nature of environmental problems. Students are introduced to a range of philosophical and other perspectives including those of theoretical ecology, environmental ethics, environmental management, the aesthetics of nature, and phenomenology and critical theory in relation to western science.

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BioScience 27, 4, 1977, 266-270.

10. For an expression of this perspective see Simon, J. and Kahn, H. (eds), *The Resourceful Earth: A Response to Global 2000*, Blackwell, 1984.

11. Drengson, A., 'Protecting the Environment, Protecting Ourselves: Reflections on the Philosophical Dimension', in R. Bradley and S. Duguid (eds.), *Environmental Ethics (Vol. II)*, Simon Fraser University, Vancouver, 1989.

12. For a definition of sustainable development consistent with this interpretation see Rees, W., 'Defining "Sustainable Development"', *CHS Research Bulletin*, May 1989, UBC Centre for Human Settlements, Vancouver, V6T 1W5. (Originally prepared as a background paper for 'Planning for Sustainable Development', a Symposium organized by the UBC School of Community and Regional Planning, 25-27 November, 1988).

13. Rowe, S., 'Implications of the Brundtland Commission Report for Canadian Forest Management', *The Forestry Chronicle*, February 1989, 5-7.

14. Rapport, D., 'The Interface of Economics and Ecology', in A-M. Jansson (ed.), *Integration of Economy and Ecology — An Outlook for the Eighties*, 1984.

15. See Georgescu-Roegen, op. cit., supra 7, 9.

16. For example, an automobile represents only a fraction of the energy and material that has been permanently dissipated in its manufacture. Modern energy-subsidized agriculture consumes up to 10 calories for every calorie of food energy produced.

17. Maturana, H. and Varela, F., *The Tree of Knowledge*, New Science Library, Boston, 1988, 43.

18. This is a mild form of the Gaia Hypothesis originally proposed by James Lovelock, that "the physical and chemical condition of the surface of the Earth... has been, and is, actively made fit and comfortable by the presence of life itself..." (*Gaia: A New Look at Life on Earth*, Oxford University Press, 1979). Long viewed with scepticism by scientists, the idea of a homeostatic Gaia has begun to attract more adherents from the mainstream due to the strength of the testable hypotheses on global feedback mechanisms it has begun to produce. See Sattaur, O., 'Cuckoo in the Nest', *New Scientist*, 24/31 December 1987, 16-18; Kerr, R., 'No Longer Willful, Gaia Becomes Respectable', *Science* 240, 1988, 393-395.

19. Perry, D., Amaranthus, M., Borchers, J., Borchers, S. and Brainerd, R., 'Bootstrapping in Ecosystems', *BioScience* 39, 4, 1989, 230-237.

20. For example, carbohydrates, fats, proteins, and nucleic acids.

21. For examples see Rees, W. 'Atmospheric Change: Human Ecology in Disequilibrium', Paper prepared for the 9th Commonwealth Conference on Human Ecology, Human Ecology, Sustainable Development, and Education, Edinburgh, 19-23 July, 1989 (proceedings in preparation).

22. Vitousek, P., Ehrlich, P., Ehrlich, A. and Matson, P., 'Human Appropriation of the Products of Photosynthesis', *Bioscience* 36, 1986, 368-374.

23. The field of environmental economics is an exception but has focused almost exclusively on means to internalize pollution damage and avoidance costs. Even recent economic prescriptions see 'environmental policy' largely as a matter of pollution control subject to variable "environmental conditions and local tastes" among jurisdictions (Baumol, W. and Oates, W., *The Theory of Environmental Policy (Second Edition)*, Cambridge University Press, New York, 1988). For a broader perspective see Gosse-link, J., Odum, E. and Pope, R., *The Value of the Tidal Marsh*, Publication LSU-SG-74-03, Center for Wetland Resources, Louisiana State University, Baton Rouge, 1974; Westman, W., 'How Much Are Nature Services Worth?', *Science* 197, 1977, 960-964.

24. The need to reflect the depreciation of ecological capital in national income accounts is increasingly being recognized. See Pearce, D., Mardandya, A. and Barbier, E., *Blueprint for a Green Economy*, Earthscan, London, 1989; UNEP/World Bank, Report of the Joint UNEP/World Bank Expert Meeting on Environmental Accounting and the System of National Accounts, Paris, 21-22 November, 1988.

25. Heilbroner, R., *The Nature and Logic of Capitalism*, W.W. Norton, New York, 1986, 75.

26. For opposing views of the utility of this concept, see World Bank, 'Rapid Population Growth and Human Carrying Capacity', *Staff Working Papers 690 (Population and Development Series 15)*, World Bank, Washington, 1985.

27. Bryson, R., *Environmental Opportunities and Limits for Development*, (Leopold Centennial Lecture, June 1986), Center for Climate Research, University of Wisconsin, Madison, 1986.

28. Ibid.

29. Brown, L., et al, *State of the World 1988*, Worldwatch Institute, Washington, 1988.

30. Ibid.

31. Ibid.

32. Rees, W., 'Energy Policy and the Second Law: Time to Ante Up', *Proceedings, Seventh Canadian Bioenergy Research and Development Seminar*, 24-26 April, 1989, Department of Energy, Mines, and Resources, Ottawa, 1989.

33. For examples of current thinking see Pearce et al, op. cit., supra 24, Ch.4.

34. Brown, L., et al, *State of the World 1984*, Worldwatch Institute, Washington, 1984, 195.

35. Ekins, P. (ed.), *The Living Economy*, Routledge and Kegan Paul, London and New York, 1986.

36. UNEP/The World Bank (op. cit. supra 24) would call these "satellite accounts", revealing a continuing economic bias.

37. WCED, op. cit., supra 1.

38. Ibid, 297.

The Environmental Destruction of the Soviet Union

by
Zhores A Medvedev

For years, the extent of environmental degradation in the Soviet Union has been hidden from the public. Glasnost, however, has revealed the growing ecological crisis facing the Soviet Union. The radioactive contamination caused by Chernobyl is but one example of the degradation caused by the headlong pursuit of industrial expansion. Whole regions have been laid waste by pollution and land degradation; river systems fatally disrupted by dams and irrigation schemes; and the health of the public is declining.

For years, it has been an article of faith amongst planners and scientists within the Soviet Union that centrally planned economies serve the interests of environmental protection better than capitalist ones. A textbook on socialism and the environment, written jointly by Soviet, Hungarian, East German, Polish and Czech authors (and recommended for law students in eastern bloc countries) maintains, for example:

"In bourgeois countries, where economic and political power belongs to the capitalist monopolies, damage and destruction to favourable natural conditions are the inevitable result of scientific and technical progress. Protection of the environment is simply incompatible with the very nature of capitalism . . . In socialist countries the rational use, conservation and reproduction of natural resources as well as a careful regard for nature are one of the bases of the development of productive forces and of improving the wellbeing of the people, an integral element of economic activity and culture."¹

Until the Chernobyl disaster in 1986, few in the USSR openly challenged that view. Secrecy and government propaganda ensured that there was no open debate in the Soviet Union about environmental issues — and that the debate that did occur was confined to small groups of concerned individuals. Censorship pre-

vented the general media from disclosing pollution statistics, even for non-toxic substances. Pollution caused by the military or nuclear industries was totally secret. The levels of everyday operational discharges of radionuclides from nuclear power stations were also classified. The methods of nuclear waste disposal and the location of the waste facilities were (and are) unknown. The Soviet people do not even know where their uranium mines and uranium enrichment plants are located. Food contamination by pesticides, nitrates or other chemicals remains unreported. Although government institutions exist to monitor the environment and to exercise toxicological control over food, they are subject to official secrecy. Unofficial measurements are strictly prohibited.

A Degraded Nation

It took an industrial and environmental disaster on the scale of the Chernobyl accident to awaken the Soviet government and alert the Soviet public to the extent of environmental degradation within the Soviet Union. Chernobyl forced the country to confront the truth: it was not socialist planning that had delayed the ecological crisis for so long, but the sheer size of the country.

The devastation inflicted on the environment can no longer be hidden. The Soviet Union has lost more pasture and agricultural land to radioactive contamination than the total acreage of cultivated land in Switzerland. More land has been flooded by hydroelectric dams than the

total area of the Netherlands. More land was lost between 1960 and 1989 through salinization, changes in the water table, and dust and salt storms than the total area of cultivated land in Ireland and Belgium put together. Amidst acute food shortages, the total acreage of cultivated land has declined by one million hectares a year since 1975. The Soviet Union is losing its forests at the same rate as rainforests are disappearing in Brazil. In Uzbekistan and Moldavia, chemical poisoning with pesticides has led to such high rates of mental retardation that the educational curricula in secondary schools and universities have had to be modified and simplified.

Nuclear Pollution: The Urals Accident

The first serious contamination of the environment with radionuclides occurred in the eastern Urals in 1957, when a nuclear waste storage site exploded. Thirty-two villages are known to have been evacuated permanently, and (in all probability) temporary evacuation took place in many others. Several hundred square kilometres of forests and agricultural land, in addition to two large lakes, were severely polluted, levels of strontium-90 reaching up to 4,000-5,000 curies per square kilometre (Ci/km²) in the most contaminated areas (see Box, page 26). Summer dust storms spread the contamination to the Chelyabinsk and Sverdlovsk regions, causing radionuclide levels to reach up to 4-8 Ci/km² (150,000 to 300,000 Bq/m²). By and large, however, the authorities took mini-

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"Nuclear waste was emptied into lake Karachai near the town of Kyshtym. But the heat of the radionuclides caused the lake to begin to dry out."

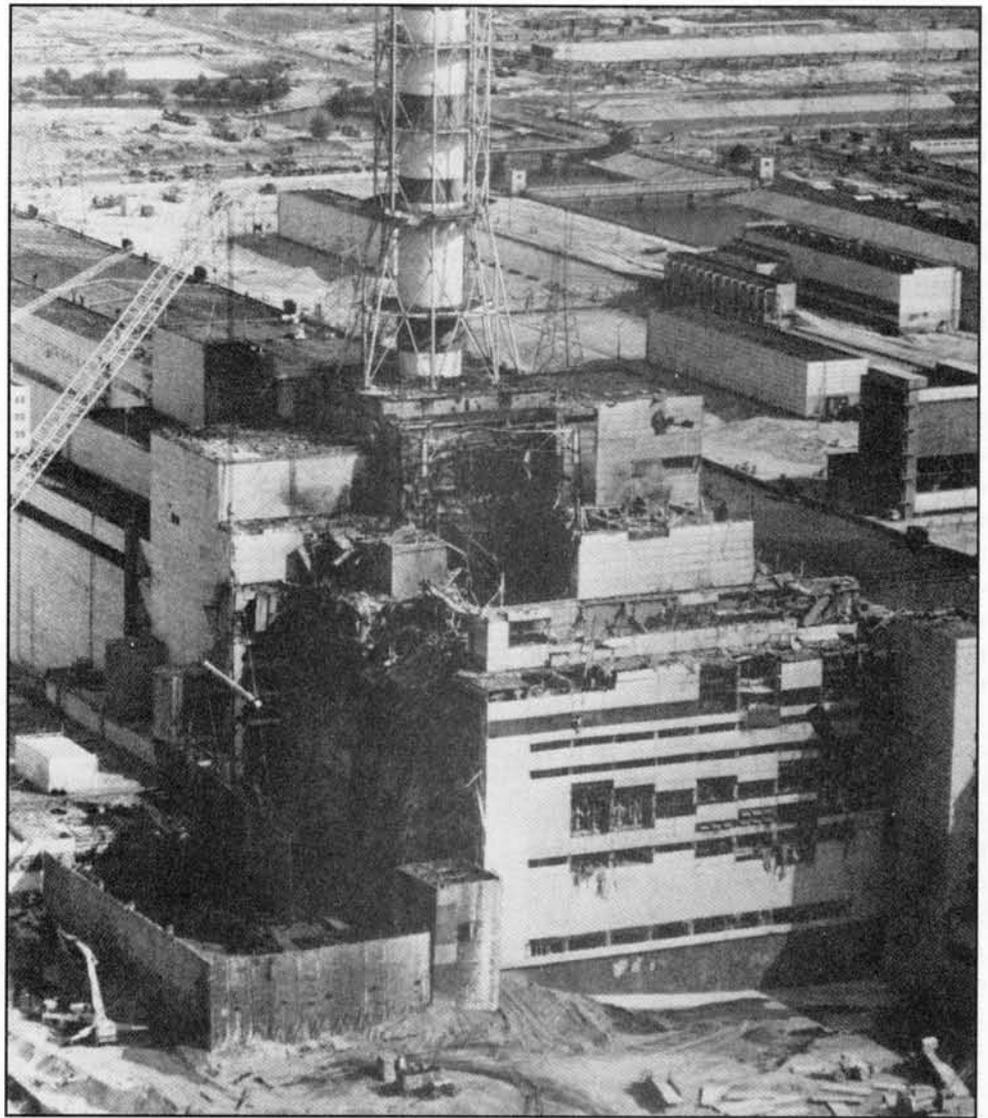
mal action, preferring to ignore the problem. Indeed, until recently, the extent of contamination remained classified.

The Urals accident remained practically unknown outside the affected regions until 1976 when I mentioned it briefly in an article in *New Scientist*.² During the debate which ensued, most nuclear experts expressed scepticism about the story. This made me carry out more extensive research, which resulted in a book, *Nuclear Disaster in the Urals*, in 1979.³ These findings were later confirmed by a special team of ecologists from the Oak Ridge National Laboratory in Tennessee, who compared satellite pictures of the area with detailed maps of the same area before 1957.⁴ In 1988, the Swedish Space Media Network agency made a television film about the consequences of the Ural nuclear disaster which was based mainly on an analysis of satellite photographs. Their pictures clearly showed the contours of the contaminated area, which was fenced off and turned into a radioactive "ecological reservation".⁵

The Soviet Ministry of Atomic Energy did not officially acknowledge that the accident had occurred until June 1989 — a full 32 years after it had happened — when a short official report was prepared for the International Atomic Energy Agency in Vienna.

On 8 July 1989, the Committee on Ecology of the newly elected Supreme Soviet of the USSR organized a hearing on the Urals accident. I was invited to discuss the official version of events. The data presented at this hearing (the proceedings of which were reported in the Soviet media and are expected to be published in full) indicate that the extent of radioactive contamination in the Southern Urals was even more serious than had been thought — and that the accident at the nuclear waste storage facility was not the only source of contamination.

The available evidence now suggests that contamination of the region between the two large industrial cities of Sverdlovsk and Chelyabinsk began in 1949, when liquid nuclear waste from a number of nuclear plants was simply dumped into the local Techa river. Eventu-



The Chernobyl disaster caused widespread contamination in the Ukraine. More than 220 villages and rural settlements have already been abandoned and more than 600 villages and towns were included in a programme of systematic decontamination. (Photo: TASS)

ally the river became so polluted that it was necessary to evacuate those living along its banks and to fence off the river. From 1952 onwards, nuclear waste was emptied into lake Karachai near the town of Kyshtym. But the heat of the radionuclides caused the lake, covering about 10 km², to begin to dry out. By 1988, Lake Karachai contained about 120 million curies of long-lived isotopes — mostly strontium-90, caesium-137, residual plutonium, etc. It has now been covered by a thick layer of concrete to prevent wind erosion.

From 1955 onwards, high level nuclear waste was stored in special concrete underground tanks lined with steel. The cooling system for the tanks was not properly serviced, however, and, on 29 September 1957, 80 tons of dried nuclear waste in one of the tanks (which also contained nitrate salts produced by nuclear reprocessing) suffered a chemical explosion which released 20 million curies of radionuclides. According to the report, 18 million curies fell to the ground in the immediate vicinity. But the remaining two

million curies formed a plume about one kilometre high which distributed radionuclides over an area of 15,000 square kilometres inhabited by 270,000 people.

In the following year, some 10,700 people were moved from the most contaminated area, where the level of Strontium-90 was higher than 3 Ci/km², and agriculture in the area was forbidden. In the rest of the territory, various decontamination measures were undertaken, which, with changes in farming practices, the authorities claimed made it possible to continue using the land, even in 'hot' spots where there was more than 10-20 curies of Strontium-90 per km². This would not have been countenanced in many other countries of the world.

Chernobyl

Chernobyl was an accident waiting to happen. Badly designed, shoddily built and poorly managed and operated, a disaster at one of the Soviet Union's nuclear

power stations was inevitable — particularly given the speed at which new stations were being rushed into service, regardless of the lack of adequately trained personnel to operate them.

Even today, the full environmental, agricultural and public health impact of the accident is unknown. It is generally assumed that the *Post-Accident Report*, prepared by Soviet experts for the International Atomic Energy Agency in August 1986, gives a full account of the accident and its aftermath, but this is not the case. At the time the report was compiled, Soviet officials did not themselves know the exact level of radioactive contamination in many rural areas, particularly outside the evacuated 'exclusion zone'. Shortages of monitoring equipment and of qualified personnel made it difficult to map the true extent of contamination. It was only in 1989 that crude maps of the environmental contamination from Chernobyl were finally published in the Soviet Union.

The Soviet authorities originally estimated that the total fall-out of radionuclides within the Soviet Union from the damaged reactor during the 10 days of the graphite fire was approximately 50 million curies. It is now obvious that this was an underestimation. The high temperature of the graphite fire and core meltdown (up to 2,300°C) caused volatile radionuclides (predominantly iodine-90, caesium-134, caesium-137 and ruthenium-103) to form a high altitude plume, thus causing the radionuclides to be distributed over the whole of the northern hemisphere. Fall-out over the Soviet Union consisted of non-volatile and volatile radionuclides — strontium-90 and plutonium being the most serious because of their long half-lives. In May 1986, about 200,000 km² of Soviet territory were considered seriously affected by radioactive fall-out with radiation readings above the level of 2 millirads/hour (mR/h).⁶

This information was only disclosed in 1989. Immediately after the accident, the actual figures of external radiation and environmental contamination were not published. Moreover, members of the public — and even research laboratories which were not directly concerned with the post-accident decontamination measures — were forbidden to use radiation monitoring equipment. An exclusion zone, from which the population was evacuated, was set up within a 30 km radius around the power station. People were told that the size of the area reflected a significant safety margin. Only gradually, due to restrictions on the sale of agri-

cultural products in local markets, roadblock controls, medical checks, and dosimetric control of meat and milk collected by slaughter houses and dairies in various parts of the Ukraine, Byelorussia and the Russian SSR, did it become clear that a far more extensive area had in fact been heavily contaminated.

Between 1987 and 1989, a further 150,000 people were evacuated from contaminated areas because they had accumulated high doses of radiation through continued exposure to the fall-out from the accident. One hundred thousand more local people can expect to be evacuated between 1990-1992, when they approach the emergency permissible limit of accumulated radiation. At least 60,000 people, mainly young people and professionals, left the contaminated areas without waiting for compensation or official resettlement. More than 220 villages and rural settlements have already been abandoned and more than 600 villages and towns were included in a programme of systematic decontamination.

Dangerous for Human Habitation

In 1989, it was officially acknowledged that an area of about 10,000 km² in various parts of the Ukraine, Byelorussia and the Russian SSR was contaminated with caesium-137 to levels higher than 40 Ci/km² and was considered dangerous for human habitation. About 150 villages are now waiting for the next wave of evacuation. In some still-inhabited hot spots, levels of

radioactive caesium as high as 90-140 Ci/km² have been found. The local population, particularly children, are already suffering adverse health effects.

A significant part of the heavily contaminated area is far from the accident site — in some cases between 100 and 400 kilometres to the south-west, west, north-west and north-east. The radioactive fall-out here was caused mainly by rain which fell during the period when radioactivity was belching from the damaged reactor. In 1989, levels of caesium-137 registered between 15 and 40 Ci/km² (50,000 to 1,600,000 Bq/m²) over some 22,000 km². According to western standards, soil contaminated with caesium-137 at levels above 50,000 Bq/m² is unsuitable for agriculture, particularly for livestock farming.

Some reports indicate that about 100,000 km² of the European part of the USSR still has levels of caesium-137 and strontium-90 higher than 50,000 Bq/m². However, these rural areas, and even those with contamination levels of above 500,000 Bq/m², continue to be farmed normally, although agricultural produce is required to undergo special treatment. According to the regulations, livestock must be transferred to clean feeding about two months before slaughter. Milk is used only to make butter and cheese. Uncontaminated milk and other produce is brought in from other areas. But because of food shortages, violations of the rules are common.

In Byelorussia alone, the loss of agricultural production in 1989 due to Chernobyl cost 700 million roubles. By 1989, the total cost of the accident was officially (and

A Radiation Death Trap

A Curie (Ci) is a measure of the number of disintegrations per second from one gram of radium, which is equivalent to 3.7×10^{10} disintegrations per second. One Becquerel (Bq) is equivalent to one atomic disintegration per second. The 4000 Ci/km² found in the areas most contaminated by the Urals accident is thus equivalent to some 150 million Bq/m².

Where fall-out occurs over pasture, one quarter of the radioactive iodine, caesium and strontium deposited will, on average, become incorporated in the grass. A cow will consume the grass from approximately 100m² every day — the equivalent of a bale of hay. Under EC regulations, set after the Chernobyl disaster, the maximum permissible levels of strontium in milk are laid down at 500 Bq/kg, and 3000 Bq/kg for other foods. The 150,000 Bq/m² found in areas some distance from the Urals accident translates into levels in cow's milk 100 times the EC standard; for goat's milk, the levels are 250 times in excess; and for sheep's milk, 500 times. Cheeses made from cow's milk would have been 150 times over the limit, and those made from sheep's milk 2000 times too high.

The 4000 Ci/km² measured in the most contaminated areas would have rendered the area a death trap.

Peter Bunyard

modestly) estimated to be 11 billion roubles (about \$20 billion). Half of this sum is due to agricultural losses and expenses. But a further 10 billion roubles are still needed for resettlement and other relief programmes. Approximately one million people now live in areas designated as 'permanent strict radiation control' areas. The Ministry of Health has raised the maximum permissible accumulated dose (including that for children) to 35 rems (under international regulations, the maximum permissible *whole life* exposure of workers in nuclear plants is 25 rems).

Ecological processes will gradually decrease the level of contamination (more quickly for caesium-137 than for strontium-90), but they will also spread the contamination to other areas through erosion, wind and other natural processes. Radiological control over soil and over agricultural produce from areas of heavy contamination will continue well into the next century.

The Impact on Health

Detailed information about the impact of Chernobyl on human health and the health of farm animals is still classified. There have been reports of steep increases in abnormalities among newborn farm animals. Six hundred thousand people who have already been exposed to radiation doses of between 10 and 200 rems will be required to undergo frequent medical checks until the end of their lives. In 1989, 38 per cent of this number were reported to be in need of some form of medical attention, whether in hospitals, as outpatients, or in sanatoria.⁷ No details were given about the nature of their health problems and most medical information is classified.

Fishing in the Pripjat river and its tributaries and in the northern part of the Kiev reservoir has been forbidden since April 1986. Hunting and collecting mushrooms and berries in the forests of southern Byelorussia and the northern Ukraine has also been banned indefinitely. In 10 regions, radiological control of agricultural produce is still in force.

The Devastation of Soviet Water Resources

The enormous financial and ecological costs of both Chernobyl and the earlier Kyshtym disaster cannot be overstated. However, in many respects, the contami-

nation they caused does not represent the most pressing ecological problem confronting the Soviet Union. Far more serious damage has been inflicted on the environment by Soviet planners' persistent efforts to transform all the rivers of the European and Eastern parts of the country into complex hydropower stations and irrigation projects. The resultant ecological problems affect not only rivers and lakes, but also the Caspian, Azov and Black seas and the plains of the Russian steppes. Indeed, as a result of the pursuit of untrammelled industrial growth, several major geographical areas are either already in a state of environmental crisis or on the brink of disaster. Space only allows me to describe a few examples.

Lake Baikal

Lake Baikal is the largest body of fresh water on earth and also the deepest. Its ecological problems are not the most serious in the Soviet Union, at least in the sense that the existence of the lake is not yet under threat. But industrial development around the lake — and particularly the construction of a cellulose factory — threatens the lake with irreversible pollution and serious damage to its valuable fish and water resources.

Industrial development plans for the lake failed to take account of local climatic and environmental factors. Biological industrial waste purification systems which were probably quite effective in the milder climate of Europe have proved useless in the cold Siberian climate. Indeed, they have failed to operate at all in the winter. The water of Baikal is too cold for effective biological purification and there is little exchange of water between the lake's surface and its deeper layers.

Effective environmental pollution measures would have made industrial and urban expansion around the lake too expensive. Yet, the direct and indirect costs of the ecological disaster now unfolding in the area are likely to exceed the cost of all the infrastructure built to date; future industrial development of the area is now under review. But this is the only example in the Soviet Union where ecologists are likely to win the battle in the long run.

The Aral Sea

The Aral Sea, once the fourth largest lake in the world, is now an ecological disaster area. It is disappearing. Between 1960 and

1989, its level dropped by 13 meters and its area decreased by 40 per cent, from 69,000 km² to 39,000 km². The disappearance of the Aral Sea is predominantly due to the increasing amount of water withdrawn from two great rivers of Central Asia, the Amu Dar'ya and Syr Dar'ya, to irrigate the cotton fields of Uzbekistan.

When the government increased the annual quotas of cotton produced from this region, the acreage of cotton fields in the Central Asian republics was increased and fertilizers and pesticides were introduced on a massive scale. The amount of water withdrawn from the Amu and Syr Dar'ya reached 132 km³ in 1980. In 1987, about 7.6 million hectares were irrigated, often using rather primitive methods which led to secondary salinization. The long Karakum Canal (it stretches for 1300 km westwards, ending in the Kara-Kum desert, instead of in the Caspian Sea as originally intended) is poorly built and more than half of its water is lost by seepage into the sand.

The bed of the Aral Sea is now exposed over an area of some 30,000 km². It contains nearly six billion metric tons of various salts (sodium chloride, magnesium sulphate, calcium sulphate and others). Salt and dust are blown from the bottom of the lake, forming clouds up to 100 km wide which can be observed from space satellites. The dust travels for miles: Aral salt has been found in the Fergana valley (the most fertile valley in Central Asia) in Georgia and even in Arctic regions. It has been calculated that between 40 and 70 million metric tons of Aral salt are dispersed in aerosol form annually by winds and storms over an area of 200,000 km² around the lake.⁸

All commercial fishing in the Aral Sea (amounting to 49,000 metric tons in 1957) has been lost. The natural conditions along the rivers have deteriorated. Hay fields and pastures have been destroyed, livestock agriculture has declined. Of the 173 animal species which used to live around the Aral and its delta, only 38 have survived — and they are endangered.

There have been substantial climatic changes, due in part to changes in humidity as the lake has dried up. The summers have become warmer and the winters cooler. Spring frosts are common late in the year, creating serious problems for farmers. In 1989, for example, cold winds brought frost and snow to large areas of Uzbekistan, Tadzhikistan and Kirgizia at the beginning of May, normally a very warm month. In some districts, 50 cm of snow covered the fields. More than 500,000 hectares of cotton plants were killed, 70

per cent of all fields sown with grain were lost, and many vineyards, melon fields and other crops were damaged, in addition to millions of fruit trees. More than half a million sheep were killed by frosts and feed shortages.

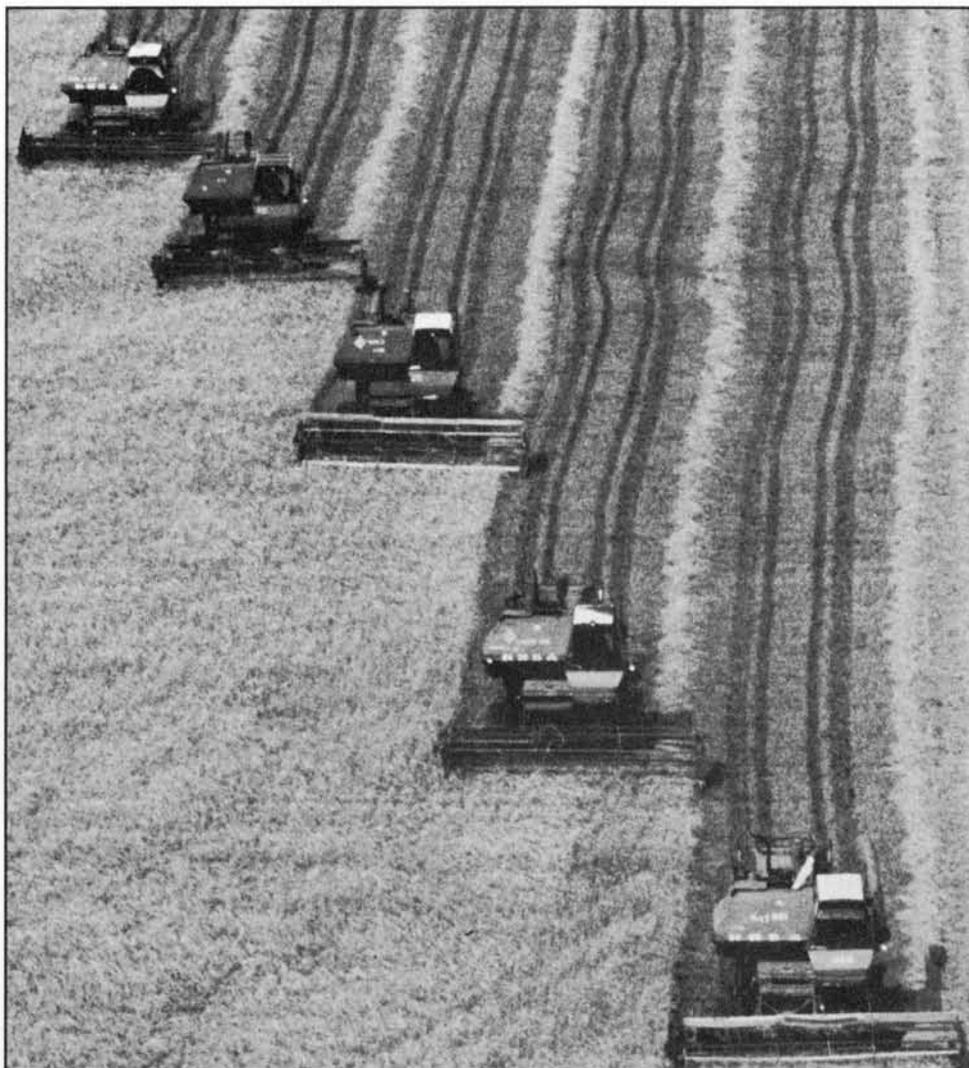
The health of the population has suffered gravely from the industrialization of agriculture in the region. The massive use of pesticides, particularly DDT, and the protracted use of child labour in the cotton fields, together with a deterioration in the drinking water supply and the absence of proper sewage and waste treatment facilities, have increased the rate of infant and child mortality (now standing at 50 to 60 per 1000 births). Epidemics and the frequency of mental retardation in children are also on the increase. Mortality from hepatitis has risen dramatically, doubling in the last decade in Central Asia.

In 1988, the government introduced a special 20 year programme to save the Aral Sea and to improve ecological and hygienic conditions in the region. The programme does not, however, address the main problem — the need to diversify crop production away from irrigated monocultures of cotton. Nor does it provide the funds required to put all the measures listed in the programme into effect.

The Volga Basin and the Caspian Sea

The Volga is Europe's largest river and the Volga basin is the cradle of the Russian nation. It occupies 1.4 million km² or a third of the territory of the European part of the USSR. One quarter of the Soviet population lives here (about 80 million people). The water of more than 200 tributaries flows into the Volga along its 3,700 km course. The Caspian Sea, the Volga and Ural rivers, and the other rivers that carry water to the Caspian from the Caucasus mountains have many unique fish species, including 10 species of salmon and several species of Russian sturgeon.

Although the Volga basin area is quite flat, the river has been crossed by a string of hydroelectric dams. The dams have transformed the river into a string of stagnant and shallow reservoirs — the smallest is Ivankovskoe, covering some 327 km², and the largest is Kuybyshevskoe, covering 6470 km² — with a total area of more than 20,000 km². The eight dams on the Volga and the four dams on the Kama river produce nearly 40 billion kilowatt hours of electricity per year. But ecologists now argue that the true economic costs of the



Harvesting wheat in Kazakhstan. The use of pesticides has led to widespread contamination throughout the USSR, with serious health effects for many local populations. (Photo: Environment).

dams — incurred through the loss of agricultural land, the resettlement of one million people, the damage to fishing, the rise of the groundwater table around the reservoirs and the decline in drinking water quality — are far greater than the income earned from their electricity output, currently put at some four billion roubles a year.

The ecological problems caused by the Volga 'cascade' (as the series of dams has come to be known) have developed gradually. Many of them could have been predicted if planners had taken environmental considerations into account. Eighty-five per cent of the world production of sturgeon is found in the Caspian-Volga system, and it should have been obvious that the construction of the Volgograd dam in the lower part of the Volga would damage fishing by interrupting the annual migration of Caspian fish to their upstream spawning grounds. Artificial fish nurseries were installed but they interrupted the natural migration patterns of the fish, with disastrous results. Pollution and the loss of

oxygen in stagnant reservoirs added to the problem. Massive fish kills have occurred every year from industrial pollution and toxic waste. Pollution is also thought to be responsible for sub-lethal damage to fish. In 1984, 20 per cent of the sturgeon stock was found to be suffering from muscular dystrophy, causing a deficiency of eggs (caviar) in female sturgeon. By 1987, 90 per cent of all sturgeon species had developed the disease and in 1989 the whole population was affected. The same illness has also affected beluga, carp and herring.

The reservoirs on the Volga have submerged two million hectares of rich agricultural land, mostly meadows. More than 2,000 villages and settlements have also been lost. In addition, rising groundwater tables have reduced the productive value of large areas of remaining land, transforming it into swamp. The increased agricultural production that the irrigation was meant to ensure has never materialized because most of the arid areas in the lower Volga basin are naturally saline, rendering them highly susceptible to salinization if

irrigated. It is reported that 700,000 hectares of irrigated land have already been lost to secondary salinization.⁹

Heavily polluted by accumulated wastes from industry, chemicals from agriculture and the discharge of poorly treated or untreated sewage from numerous cities and towns, the stagnant reservoirs of the Volga dams have become a source of disease for both humans and livestock. Indeed, it is no exaggeration to state that decades of abuse have brought the Volga to the brink of ecological death — a man-made disaster that even the Soviet media now calls an “ecological crime”.

Water Pollution in the Ukraine

Even before Chernobyl, the Ukraine had already suffered severe ecological degradation due to hydroelectric dams. Five dams cross the Dnieper. Only one of them, the oldest at Zaporozh'ye, has avoided major ecological disruption, primarily because it is a run-of-the-river dam and thus has no large reservoir. All the other dams required the flooding of very large areas of rich agricultural land. Heavy industrial development in the Ukraine and the growth of cities along the rivers Dnieper, Dniester and Don have increased the consumption of water to the extent that less than half of the water flowing down the Dnieper now reaches the Black Sea. The Ukraine also has many nuclear power plants, some of them intended for direct central heating and situated very close to cities (one is only two kilometres from Odessa, the main Soviet port). Industrial waste, untreated sewage and agrochemicals have — as in other parts of the USSR — heavily polluted the rivers. The fishing value of the Azov Sea has been dramatically reduced, to about five per cent of 1950 levels. About 4.5 million tons of fish were lost due to pollution in the Azov Sea from 1952 to 1975, with an estimated value of two billion roubles.¹⁰

Grim Prospects for the Black Sea

Fisheries in the Black Sea have also been seriously affected by recent industrial and agricultural development. The shallow waters of the Black Sea coast have always been famous for commercial fishing, particularly for sturgeon, herring, khasma, and mullet. The Black Sea is the largest anoxic marine basin in the world. Below the layer of oxygenated surface water,

hydrogen sulphide builds up to very high concentrations, with the result that only the upper layer of the sea can support fish. Below a depth of 200-300 metres there is no oxygen. This makes the Black Sea extremely vulnerable to industrial pollution and any disruption of fresh water supplies (salinity is low in the top layer of the sea and high in its deeper parts).

The extensive industrial development of the Ukraine, the Crimea, and the eastern parts of the Black Sea coast, combined with poor waste management, have polluted the Black Sea particularly badly. Moreover, the withdrawal of water from the Rivers Kuban, Don, Dnieper, Dniester and Danube, partly for irrigation and partly for hydroelectric projects (much of the water is lost through evaporation) has reduced the inflow of fresh water into the Black Sea and triggered a dangerous process of thinning its oxygenated surface layer. Several international studies have reported that the upper boundary of the anoxic sulphide layer in the water column has risen by 30 metres in the last 10 years.¹¹

The reduced flow of the rivers entering the sea has also increased the intrusion of salt water from the Mediterranean through the Bosphorus, with the result that the salinity of the surface water is also increasing. New industrial projects (the Danube dam, the Danube-Dniester canal and others) are expected to reduce the fresh water inflow still further. The prospects for marine life in the Black Sea and for those who live on its shores are grim indeed.

Official Indifference

Numerous decrees have been passed since 1960 to protect the environment. Few of them have been implemented, however, and where they have been, the legislation has never been properly enforced. Where new industrial projects over-run their budgets, it is environmental protection measures that are cut or shelved. State pollution standards are not enforced and the level of pollution in most cities is many times higher than the official ‘maximum permissible’ level. The government owns all industrial enterprises: imposing fines for violations of pollution standards thus makes no sense because both the investment in anti-pollution facilities and the payment of the fines come from the state budget. And if it is cheaper to pay the fines, anti-pollution measures go by the board.

Nationalized in 1917, land and other resources, including water, are considered free commodities. This not only leads to

waste but also means that industries are not interested in the conservation of resources. State farms, collective farms and individuals obtain irrigation water free of charge: the result is that they have no interest in installing proper drainage or in the more efficient use of water resources. Hydroelectric projects do not take account of the cost of flooded agricultural land or forests.

Glasnost has exposed many of the problems caused by environmental mismanagement and poor planning. It has also revealed the extent of the damage inflicted to date on Russia's environment. But *perestroika* has not yet generated the means, expertise and capital even to put right the damage done. It has been calculated that about 100 billion roubles of investment (\$160 billion) are necessary immediately, and 10 billion roubles annually, just to reduce the contamination of air in urban areas to officially permissible levels. But the government currently provides a total of about 10 billion roubles annually for all environmental and ecological programmes.¹² This makes it possible to monitor ecological degradation but not to reduce or reverse it. It is regrettable that in the pursuit of the short-term benefits and artificial comforts of a consumer society, the eternal and most vital conditions of human existence — clean air, clean water and a renewable and balanced natural environment — are systematically being ruined.

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References:

1. Kolbasov, O. S. (ed), *Sotsializm i okhrana Okruzhayushchei sred'y*, Yuridicheskaya literatura, Moscow, 1979, 15.
2. Medvedev, Zh. A., ‘Two decades of dissidence’, *New Scientist* 72, 1976, 264-7.
3. Medvedev, Zh. A., *Nuclear Disaster in the Urals*, W. W. Norton, New York, 1979.
4. Trebalka, J.R., Eyman, L. D. and Auerbach, L. D., ‘Analysis of the 1957-1959 Soviet nuclear accident’, *Science* 209, 1980, 345-53.
5. Agerberg, M., ‘30 ar efter olyckan byggs anlagningen ut’, *Ny Teknik* 49, 1989, 18-19.
6. *Pravda*, 20 March, 1989.
7. *Izvestiya*, 26 April, 1989.
8. Micklin, P.P., ‘Desiccation of the Aral Sea: A water management disaster in the Soviet Union’, *Science* 241, 1988, 1170-6; Monun, A., ‘Zastoinyye zony’, *Novyi mir* 7, 1988, 162-72.
9. Zalygin, S., ‘Vosvrashchayas' k vodnym problemam’, *Kommunist* 13, 1988, 52-5.
10. *Ekonomicheskaya gazeta* 40, October 1988, 29.
11. Murray, J.W., Jannasch H. W. et al., ‘Unexpected changes in the oxic/anoxic interface in the Black Sea’, *Nature* 338, 1989, 411-3.
12. *Ekonomicheskaya gazeta* 50, December 1988, 16.



Export promotion in Ghana. International trade is largely regulated through GATT, the terms of which are mostly dictated by the interests of multinational corporations and international trade associations. (Photo: P. McCully).

International Trade and the Environment: An Environmental Assessment of the General Agreement on Tariffs and Trade

by
Steven Shrybman

The great majority of international trade is regulated under the General Agreement on Tariffs and Trade (GATT). Although politicians and policy-makers are now proclaiming the need for international co-operation on environmental problems, GATT is currently being re-negotiated in a shroud of secrecy, and almost totally without reference to environmental considerations. The GATT agenda of promoting 'free trade' will have severe impacts upon national attempts to protect resources.

Perhaps the most significant dimension of global economic activity is international trade. The value of world trade in 1987 was in excess of \$6 trillion and it continues to grow, yet there has been little, if any, effort to assess the environmental significance of international trade and trade agreements.¹ In many developing countries, where the impact of trade upon the environment is already being keenly felt, trade represents more than 50 per cent of GDP.²

The rules of international trade are embodied in several bi- and multi-lateral agreements, of which the most important by far is the General Agreement on Tariffs and Trade (GATT), which covers approximately 90 per cent of world trade among nearly 100 countries.

Initially drafted in 1947, GATT is periodically amended by complex negotiations that may span several years. The current round of negotiations, known as the Uruguay Round, will conclude in December 1990. The result will be a comprehensive set

of rules that will greatly influence global economic activity for the next decade — the decade that will, from an ecological perspective, be the most critical in human history.

In that it determines, to a large extent, the scale and character of international resource exploitation and use, the new GATT accord will have a considerable influence upon many of the world's most pressing environmental problems. In fact, it is arguable that GATT may, to a greater degree than any other international instrument or treaty, determine whether we will be able to accomplish the sustainable environmental policies that are necessary for the very survival of our species.

Yet GATT is being re-negotiated with virtually no consideration of its environmental implications. The governmental institutions that have responsibility for trade negotiations have no mandate to address environmental issues, nor the expertise to do so. Environmental organizations are neither being consulted nor being given an opportunity to comment on the various proposals that are being advanced by their respective governments. Instead, participation is restricted to large corporations and trade associations which pursue an agenda of economic growth, profit

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maximization and deregulation. The shroud of secrecy which surrounds trade negotiations allows these objectives to be advanced in private and without regard to their environmental consequences.

Yet as long as the environment remains an externality that is ignored during the trade negotiation process, trade agreements will often institutionalize principles that are at odds with, and at times antithetical to, the objectives that are being pursued through international environmental agreements. In the confrontations that will inevitably arise between trade and environmental objectives, recent experience indicates that there is no reason to be sanguine about the prospects of the latter prevailing.

Liberalizing Trade: Reducing Export Controls

The aim of the current GATT negotiations is to 'liberalize' international trade by reducing import and export controls, and by eliminating 'non-tariff' trade barriers.

With respect to export controls, Article XI of GATT provides:

"No prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licenses or other measures, shall be instituted or maintained by any contracting party on the imposition of any product on the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party" (emphasis added).

The environmental — and social — impact of such a policy is likely to be far reaching. The ability to control the export of resources is vital to any country seeking to establish conservation policies to protect indigenous resources. This ability will be directly undermined by the easing of export controls. At the same time, limiting the right of nation states to restrict the export of their resources will be of greatest benefit to those developed countries that have already co-opted the largest share of the world's natural resources, and which would like to ensure that they remain freely and cheaply available.³

Particularly disturbing is the insistence that export restrictions for agricultural commodities be abolished. Currently Article XI, 2(a) of GATT provides the following exception to the prohibition on export controls:

"Export prohibitions or restrictions temporarily applied to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting contracting party" (emphasis added).

Of course temporary restrictions will be of little avail to relieve chronic food shortages, but even this limited exception is in jeopardy because the US has proposed that it be abolished.⁴ Thus countries would be precluded from imposing export restrictions on foodstuffs no matter how great local deprivations.

Transnational corporations control "80 per cent of the world's land cultivated for export-oriented crops", and "80-90 per cent of the trade in tea, coffee, cocoa, cotton, forest products, tobacco, jute, copper, iron ore, and bauxite is controlled in the case of each commodity by the three to six largest transnationals."⁵ It is the priorities of these corporations that are reflected in GATT and it is under their influence that Third World countries are expanding the production of cash crops for export at the expense of growing crops that meet the needs of local people.⁶

The social impacts of such policies for the people of the developing world are appalling. Less apparent, but probably

even more destructive over the long term, are the ecological consequences of such policies. By putting valuable agricultural resources at the service of export markets, in countries that are not self-sufficient in food, enormous pressures are created for local peoples to over-exploit other resources simply to eke out the barest existence.

Lifting Import Controls

A similar trade liberalization policy is being pursued with respect to import controls. The objective of the present GATT negotiations is:

"A substantial reduction or, as appropriate, elimination of tariffs by all participants . . ."⁷

The reduction of import controls may undermine efforts to establish or maintain tough environmental protection measures and standards in both the developing and developed world. For a country wanting to maintain stringent environmental standards, while not undermining the competitiveness of its domestic industry, the choices are simple:

- a) Establish import tariffs to offset pollution control costs so that domestic producers will not be at a disadvantage when competing with imports from jurisdictions without similar environmental regulation, or;
- b) Subsidize the cost of environmental protection with general revenues by underwriting pollution control costs.

Both of these options, however, are at odds with GATT which explicitly limits the right of governments to implement tariffs, and which prohibits the use of certain subsidies, and renders others vulnerable to measures which will neutralize their impact.^{8,9}

The only alternative for creating a 'level playing field' that does not violate the principles of liberalized trade, is the reduction of pollution control costs by de-regulation or by not regulating in the first place.¹⁰ *The failure of a government to regulate has never been challenged as representing a subsidy, and there is no precedent for such a complaint.*¹¹

In fact, permitting polluters freely to appropriate common resources such as air and water is probably the most common form of 'environmental subsidy' and it can confer enormous benefits upon its recipients. For developing countries, this insidious form of 'subsidy' often presents a critical opportunity to gain a comparative advantage in 'pollution-intensive' goods. The willingness to endure environmental and resource damage becomes the *quid pro quo* of attracting investment and earning export currency. Developing countries desperate for economic growth have been willing, or persuaded, to endure the environmental, public and occupational health costs associated with our most hazardous enterprises. Specific instances of hazard export have been documented for the asbestos, non-ferrous smelting and chemical industries.¹² While quantification is difficult, a study undertaken for the Brundtland Commission estimates that in 1980 developing nations would have incurred over \$14 billion in pollution control costs if they had had to meet the environmental standards then prevailing in the US.¹³

The same dynamics have encouraged a flourishing trade in hazardous waste. Disposal costs in some developing countries are as low as \$40 for wastes that would have cost as much as \$250 to \$300 to dispose of in the US.¹⁴ While efforts are presently under way to negotiate treaties that would curtail the export of hazardous waste, the measures that are being advanced through

Free Trade Versus the Environment The Case of the Canada-US Free Trade Agreement

In June 1988 both the US and Canada actively participated in a world conference on 'The Changing Atmosphere: Implications for Global Security'. The final statement of that conference begins with the unequivocal statement that: "Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war." To avert this pending ecological catastrophe, the conference recommended that global carbon emissions should be reduced by 20 per cent by the year 2005. Energy policies and planning would therefore have to be fundamentally reoriented to favour energy efficiency and conservation.

Later that same year, the Canada-US Free Trade Agreement was ratified, enshrining, in the words of President Reagan, "an economic constitution for North America". Unfortunately, this new constitution entrenches energy and other resource policies that are fundamentally at odds with the policies endorsed by the global warming conference.

Under the terms of the Free Trade Agreement (FTA), both countries forego, for as long as the Agreement stands, the use of regulatory devices that could prevent the development of fossil fuel resources for export. In addition, subsidies for oil and gas exploration and development are given special status under the Agreement and insulated from attack under the trade protection laws of either

country. Subsidies and other programmes intended to encourage energy efficiency and conservation measures are accorded no similar protection.

The first and already observable effect of the FTA has been to prompt a new round of energy mega-projects in Canada intended to serve US markets. Guaranteed access to Canada's energy resources will prolong the inefficient use of non-renewable resources, forestall the imperative to concentrate on energy conservation and efficiency, and significantly increase carbon emissions to the atmosphere.

The FTA has fundamentally diminished Canada's sovereign right to restrict the export flow of its resources. In the words of the United States Trade Representative, the Agreement assures an essential priority of US trade policy — "secure supplies of energy at stable and reasonable prices . . ." — by proscribing future "government interference" in the trade of energy resources.

The restrictions engendered by the Agreement go far beyond those set out in GATT and obligate Canada to share its resources with the US even when it may be rationing them domestically, and no matter how severe the environmental impacts of exploration and exploitation. Significantly, the Canada-US Trade Deal has frequently been described as a prototype for other bilateral and multilateral agreements.

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GATT to weaken controls on exports run counter to these initiatives.

It is worth noting that the export of polluting industries to the developing world is not perceived by GATT to be at all detrimental:

"...it would not seem desirable for any country to adopt measures designed to stem such flows of investment and trade as might result from international differences in pollution control norms."¹⁵

GATT and Non-Tariff Barriers

By advocating the removal of export and import controls, the goals of economic growth and profit maximization can be pursued in a largely deregulated global environment. In the terms of this agenda, environmental programmes or regulations are seen as 'non-tariff trade barriers' which have to be removed. Examples include Danish waste reduction legislation (*see* box, page 33), and proposed Dutch regulations concerning automobile pollution control devices.

In North America, the Non-Ferrous Metals Producers Committee (NFMPC) has complained that a variety of federal and provincial programmes intended to reduce emissions from, and improve workplace safety in, several Canadian lead, zinc and copper smelters constitute unfair trade practices. The NFMPC is using a provision of the implementing legislation for the recently concluded Canada-US Free Trade Agreement (FTA) to support its case. The US Trade Representative has determined that there is "a reasonable likelihood" that their complaint is well-founded.¹⁶

Should the NFMPC position prevail, Canada may well choose to abandon these environmental programmes rather than face retaliatory action. It was precisely this path that the Province of British Columbia recently chose when it abandoned reforestation programmes to avoid heavy export taxes. Those taxes had been imposed by Canada in response to US lumber industry claims that the programmes represented unfair subsidies, notwithstanding the fact that similar claims had failed to be borne out. Rather than challenge the inconsistent rulings of the US trade administration, Canada chose to avoid the disruption and uncertainty of litigation and acquiesced in US demands.¹⁷ It is also likely that regulators will seek to avoid regulatory initiatives that might be challenged as barriers to trade. For example, Canada's Department of Consumer and Corporate Affairs has responded to Canadian concerns about irradiated foods with the following:

"It is recognized that the labelling requirements of Canada and the USA may need to be further coordinated to avoid a potential non-tariff trade barrier."¹⁸

As trade negotiations take place, and are concluded, in private, democratic institutions that are increasingly willing to respond to public pressure to protect the environment, are circumvented. By characterizing environmental regulation as a non-tariff trade barrier, discussion can be removed to a less public forum, and one more sympathetic to the interests of those opposed to environmental regulation.

Global Harmonization

Another way in which trade agreements can undermine efforts to

establish environmental standards that reflect the priorities of the communities that will live with them, is by harmonizing standards on a global basis. Angry at decisions such as Europe's ban on the importation of beef that is fed with growth hormones, the US has included as part of its GATT agenda the global harmonization of health and safety standards.¹⁹ While the development of an international consensus around environmental standards may be a desirable objective, there are several reasons to suspect that the agenda of 'free trade' is to lower environmental standards, while placing the standard setting processes in the hands of institutions that are less accountable to the community and more amenable to corporate influence and control.

Again the Canada-US Free Trade Agreement offers an insight into the nature of the corporate agenda. Chapters six and seven of the FTA require the parties to harmonize technical and agricultural standards. As part of the bargain, Canada agreed to "work toward equivalence" with a risk-benefit regulatory model for pesticide registration. This regulatory approach is opposed by US and Canadian environmentalists and had, until the trade deal, been successfully resisted in Canada where, compared to the US, 20 per cent fewer active pesticide ingredients and seven times fewer pesticide products had been registered.

Current negotiations between the US and Canada on harmonization will significantly influence packaging-related standards, workplace health and safety regulations and other matters that have considerable environmental significance. Advisory committees have already been established to assist with those negotiations, but as is true for present GATT negotiations, no environmentalists are participating in these discussions, nor have they been invited to do so.^{20,21}

GATT and Environmental Protection

A review of GATT's instruments and associated documentation confirms that the environmental dimensions of international trade have been almost entirely overlooked. For example, the word 'environment' is not used in GATT, and it would be extremely difficult to argue that GATT rules should be read as being subject to some overriding, and unarticulated concern for the environment.²²

In response to this criticism of GATT, it has been suggested that Article XX of GATT establishes an environmental protection provision.²³ In particular, reference is made to Article XX (b) which provides:

"Article XX (General Exceptions)

Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures . . . necessary to protect human, animal or plant life or health."

There are of course a host of environmental and resource conservation measures that would be very difficult to defend as measures to protect human, animal or plant life. More to the point, however, is the fact that there is no reported precedent under GATT that invokes this provision to justify environmental protection measures, nor was this provision intended for that purpose.

Rather the legislative history of this provision makes it clear

Environmental Legislation or Non-Tariff Trade Barrier?

A recent decision of the Court of Justice of the European Community illustrates the incompatibility of liberalized trade and environmental protection, and it establishes an unfortunate precedent.

At issue was a Danish waste reduction regulation that required all beer and soft drinks to be sold in returnable containers. As noted by the European Court, the Danish regulations were "highly effective" and made no distinction between beverages manufactured or bottled domestically and those imported to the country. Nevertheless, other member states of the European Community objected, as did retail trade associations which complained about the costs of establishing collection systems and argued for the right to market non-refillable containers.

In considering the case, the European Court noted the mandatory obligation established by the EEC treaty to preserve, protect and improve the quality of the environment. It found the Danish regulations to be a *bona fide* and successful effort to accomplish environmental objectives.

Even after taking these findings into account, the Court found that Denmark had failed to satisfy the onus of having to prove that its measures were "not disproportionate to achieve a legitimate aim". Acknowledging the fact that no actual restraint of trade had actually arisen, the Court reasoned that reuse regulations could be more expensive for importers than for domestic producers.

The Court concluded:

"There has to be a balancing of interests between the free movement of goods and environmental protection, even if in achieving the balance the high standard of the protection sought has to be reduced".

The Court found Denmark in breach of its obligations under the EC.

that it was intended to protect "quarantine and other sanitary regulations".²⁴ Further, it is a fundamental tenet of legal interpretation that the meaning and application of an agreement be determined by the intent of parties at the time that it was concluded or amended. Environmental protection was simply not a public issue in 1947, when Article XX(b) was drafted, and no effort has been made since then to amend the Agreement to reflect contemporary priorities. It is simply not plausible to suggest that environmental protection be left to a 40-year-old GATT provision that was never intended, nor used, for that purpose.

Conclusion

Policy support for the principles of environmental protection and resource conservation can be found in a host of national and international initiatives, and there is a dawning recognition of the need to integrate these objectives with economic policy and planning. The final communique of the July 1989 Paris Summit of the 'Group of Seven' most industrialized countries, devoted 8 out of 22 pages to addressing the "urgent need to safeguard the environment for future generations", and it noted that "environmental protection is integral to issues such as trade . . .".²⁵

It is apparent that if GATT rules are to work in harmony with these objectives, the priority of environmental protection and resource conservation must be made explicit and set out clearly in the GATT agreement. But the conditions laid down will need to go deeper than mere rhetoric. So long as the agenda of liberalizing trade through deregulation is pursued, environmental and resource management initiatives will continue to be undermined. Alternative trade proposals must be created so that trade can serve the objective of sustaining the biosphere, rather than destroying it.

Notes and References

1. UNCTAD, *Handbook of International Trade and Development Statistics*, 1988, UN, New York, 1988.
2. *Ibid*; also see WCED, *Our Common Future*, Oxford University Press, 1987, 79; Ekins, P., 'Trade and Self-Reliance', *The Ecologist* 19, 5, 1989.
3. Dr David Suzuki, 'It's a Matter of Survival', (a 5 part radio series broadcast by the Canadian Broadcasting Corporation, August-September, 1989) especially Parts 1 and 2.
4. US Negotiating Group on Agriculture, 'Elaboration of US Agriculture Proposal With Respect to Food Security', USTR, 14 April, 1988; and see press kit provided by the USDA with 'Discussion Paper on Tariffication Submitted by the United States', MTN.GNG/NG5/W/97, 10 July 1989, 'Qs and As on Tariffication', p. 4.

5. UN Centre on Transnational Corporations, *Environmental Aspects of the Activities of Transnational Corporations: A Survey*, UN, New York, 1985.
6. United Nations, *Transnational Corporations in Food and Beverage Processing*, ST/CTC/19, UN, New York; WCED, *op. cit.*, supra 2, 68, Box 3-1.
7. Multilateral Trade Negotiations The Uruguay Round, 'Trade Negotiations Committee, Record of the Mid-Term Meeting in Montreal on December 5-9, 1988', MTN.MTC/8(MIN), 7.
8. GATT Article XI. There is no provision of the GATT rules that would allow the imposition of a tariff to offset pollution control costs.
9. GATT Article XVI.
10. Two other options could also compensate industry for comparatively higher pollution control costs: lower wage rates, or a devalued currency. However, both would have major fiscal and social implications and neither could be used with any precision to address the differential costs of environmental regulation. To be effective, compensatory mechanisms would have to be sector specific, and adjusted with respect to specific national regulatory regimes.
11. Komoroski, K.S., 'The Failure of Governments to Regulate Industry: A Subsidy Under GATT?', *Houston Journal of International Law* 10, 2, 1988, 189. Komoroski argues that a US plaintiff could challenge an exporting government's failure to regulate, as a countervailable subsidy. A review of his article however reveals that such a proposition is entirely novel and unprecedented. In addition, to succeed the plaintiff would first have to establish the existence of an affirmative duty to regulate for the purposes of protecting the environment.
12. Castleman, B., 'The Export of Hazardous Factories to Developing Nations', *International Journal of Health Services* 9, 4, 1979, 570. For an example see, Keohane, K., 'Toxic Trade-Off: The Price Ireland Pays for Industrial Development', *The Ecologist* 19, 4, 1989.
13. Walter, I. and Loudon, J.H., 'Environmental Costs and the Patterns of North-South Trade', prepared for WCED, *op.cit.* supra 2, 1986.
14. Brown, L.R. et al, *State of the World 1989: A Worldwatch Institute Report on Progress Toward a Sustainable Society*, Norton, New York, 1989, 70 and Ch. 4, footnote 47.
15. *GATT: Studies in International Trade, Industrial Pollution Control and International Trade*, GATT, Geneva, 1971, 23.
16. *Gatt Fly*, 'US Companies Use FTA to Attack Regional and Environmental Aid', Toronto, 1989.
17. For a more detailed discussion of the Canada-US softwood lumber dispute, see Yoder, C., 'Legal Aspects of Trade Distortion', in Saunders (ed.), *Trading Canada's Natural Resources*, Carswell, Toronto, 1987.
18. Consumer and Corporate Affairs Canada, *Communique* 52, 1988.
19. See the Uruguay Round Mid-Term Agreement, *op. cit.*, supra 7, at p.13C.20 (1): "develop harmonization and phytosanitary regulations and measures". Also note Chapter 6 (technical standards) and Chapter 7 (agricultural standards) of the Canada-US Free Trade Agreement. It is also worth noting that the US has characterized the EC's ban on growth hormones as a "clear non-tariff barrier", in a letter from Clayton Yeutter, Secretary of Agriculture for the US Government, to the Honourable Ray McSharry, Member, Commission of the European Communities, July, 1989.
20. For example, negotiating teams are presently constituted to address standard harmonization for packaging. The results will have a significant bearing upon the ability of both jurisdictions to implement waste reduction initiatives. Yet no environmental group is represented, neither has any public notice been given of the exercise. Rather, advisory committees are predominately comprised of representatives of government and business (pers. comm. with Larry Dworkin, September 1989, who represents the Packaging Association of Canada on one of the packaging negotiating teams).
21. The International Trade Advisory Committee (ITAC) which exists to advise the Canadian Government on GATT negotiations, includes no representatives of either environmental or consumer groups, (pers. comm. with John Klassen, Senior Co-ordinator, Office of Multi-lateral Trade Negotiations and International Trade, October, 1989).
22. The word 'environment' does not appear in the General Agreement itself. It is however used on one occasion in a collateral agreement on the interpretation of the prohibitions against the use of non-export subsidies set out in Article XVI:3 of the General Agreement. In that collateral agreement the parties recognize, subject to several qualifications, the validity of subsidies that may be used to effect the "redeployment of industry in order to avoid congestion and environmental problems." It should be noted that even this limited qualification would not protect a subsidy that was intended simply to protect the environment, reduce pollution or conserve resources. See: Agreement on Interpretation and Application of Articles VI, XVI and XXIII of GATT, Article 11.
23. In the debate that took place in Canada concerning the environmental implication of the Canada-US Free Trade Agreement, the Conservative Government made repeated reference to Article XX of GATT. Even were there to have been substance to this assertion, it would have been of little avail under the Free Trade Agreement, because the application of Article XX did not extend to those provisions of the Deal that were most problematic environmentally (Ch. 4 and 9).
24. See GATT, *Analytical Index, Notes on the drafting, interpretation and application of the Articles of the General Agreement*, (3rd edition), Geneva, 116.
25. Summit of the Arch, 'Economic Declaration', July 16, 1989, 13.

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E 1



Books

Alternative Development for North and South

TOWARDS A THEORY OF RURAL DEVELOPMENT, by G.V.S. De-Silva, Wahid-ul-Haque, Niranjana Mehta, Md. Anisur Rahman and Ponna Wignaraja, Progressive Publishers, Lahore, Pakistan, 1988.

Towards a Theory of Rural Development is a collection of studies which had previously been published separately by the Dag Hammarskjöld Foundation. The study is a result of an investigation by a team of South Asian scholars into precisely what an 'alternative development strategy' might mean for the rural areas of their region. They endorse the five basic characteristics of an alternative development strategy laid down in *What Now? Another Development* (The Dag Hammarskjöld Foundation, 1975). These are that development should be need-oriented, endogenous, self-reliant, ecologically-sound and should involve structural changes in society.

The work on which the book is based can claim to be historic as it was one of the earliest and most detailed examples of the theory and methodology which have come to be known as 'participatory action research', and which is now fashionable in development institutions around the world. With its practical focus on grassroots people's actions and organisations, it prefigured much of the new interest in 'non-governmental organisations' (NGOs) which has been one of the most remarkable features of development thinking in this decade.

The South Asian team was able to strike a rare balance between theory and practice as the team members were eminent intel-

lectuals who were quite at home in the rarified atmosphere of the UN system or Western development institutions, but who had never lost their empathy and contact with the poor people in the countries from which they came (Bangladesh, India and Sri Lanka), and to which they often returned. The result is a book which transforms an interesting intellectual theory into a compelling programme for social and economic change.

The approach of the authors, whether in Thailand, South Korea or their home countries, was always first to get under the skin of the people they were concerned for, with the belief that these people had to be the subjects, not the objects, of development if the process was either to benefit them or to be sustainable. The result is a fascinating, detailed analysis both of the broad trends happening in those countries at the time, and of the most intricate social and economic details of village life. This sets the context for the specific people's movements with which they were concerned: the struggles of Bhoomi Sena, the 'Land Army' of tribal peoples in the hills near Bombay; the "spirit of diligence, self-help and cooperation" of the Saemaual Movement in rural villages in South Korea; the Deeder Co-operative in Bangladesh; and several others.

By meticulously observing the operations of these effective organisations, which had had a positive impact well beyond the village level, the authors construct their theory of rural development.

"Development is a process by which one's overall personality is enhanced... Personality stands for distinct identity, self-confidence, creative ability, an ability to face the world with poise, purpose and with pride."

For the poorest, this process normally has to be initiated from outside, but it is crucial that the initiator only provides "help for analysis and understanding of (the people's) situation" and does not tell them what to do. In this way the people gradually become aware of the forces which limit and constrain them, and this awareness generates both the will and decision-making power to act: to seize land that had been illegally sequestered, in the case of the Bhoomi Sena; to save collectively for production assets in the case of the Deeder Co-operative. Taking action generates skills, resources and confidence, which provide the basis for further collective reflection, leading to further action or an expansion of organisation or both. This action-reflection cycle is one of the most

distinctive features of this type of development.

The detailed analysis provided by the authors, together with examples of the theory in practice, mean that this book is important for many people other than development theorists. It could, in fact, serve as a handbook for development practice, giving as it does much detailed and hard-headed advice on project design, organisation, implementation and evaluation. Furthermore, this approach is not just for rural people in South Asia. Provided that the socio-economic context is analysed accurately and sensitively, there is no reason why these techniques should not be applied in cities as well as villages, in the North as well as the South, indeed anywhere where communities are afflicted by poverty, deprivation and despair.

Thus the means for resolving the trauma of the world's poorest peoples in the remotest country areas, could provide an important impetus to solving some of the most intractable problems in the cities of the industrial world. There is, of course, a huge distance still to travel before the prospect becomes anything like a significant reality. But with this work in South Asia seeds of change were sown. This book is now an important chance to reap some of the harvest.

Paul Ekins

Paul Ekins is Research Fellow at the School of Peace Studies, University of Bradford, Bradford, West Yorkshire BD7 1DP, UK. He is editor of *The Living Economy* (Routledge and Kegan Paul, 1986).

Green Revolution: Violence Against Women and Nature

STAYING ALIVE: Women, Ecology and Development, by Vandana Shiva, Zed Books, London, 1989, £8.95/\$15 (pb), £29.95/\$55 (hb).

Staying Alive grew out of Vandana Shiva's involvement with the struggles of rural Indian women over the last decade, struggles which, as the author shows so thoroughly, question the meaning of "a progress, a science, a development which destroys life and threatens survival."

For centuries, the women of rural India have provided food, fuel and water for their communities by their systematic and sustainable management of forest, land, animals, and water resources. Develop-

ment activities introduced by the West in the last 20 years divide each of the functions which these natural resources provide into separate, profitable activities, such as tree farming, green revolution agriculture and dairy farming, which are then taken over from women by men. The dual result of this reductionist development is that the resources of nature are polluted and exhausted; and women are impoverished and marginalized.

A physicist and philosopher, Vandana Shiva traces Western models of development and progress back to the origins of modern Western science. The scientific revolution in Europe transformed nature from a vital, interdependent world into a static and manipulable one — a machine that could be taken apart and reconstructed, and a storehouse of raw materials to be mined and plundered. Using the image of nature as female and science as male, the architect of modern science, Francis Bacon, exhorted science to wrest nature's secrets from her breasts, womb and bowels. The keystone in his overarching programme for science was to compare nature to a powerful, elusive and difficult woman — a highly indicative metaphor given that he was writing in the period of the European witch-burnings. The method of scientific information gathering was modelled on witch trials: interrogation, torture and force.

Centuries later, the models of development forced on the Third World by Western governments, multinational corporations and international aid agencies are a form of violence against nature and women, they "violate the integrity of one and destroy the productivity of the other."

Shiva tells the proud history of the Chipko resistance movement among rural Indian women which was inspired by the 300-year-old story of Amitra Devi, who along with more than 300 people was axed to death trying to save their sacred trees by clinging to them. The modern Chipko movement is fighting against commercial forestry in the Himalayas because it is destroying local forests and water resources by replacing forest with monoculture 'tree farms'.

Like the thousands of housewives and mothers throughout the United States who have mobilized to protest against hazardous waste dumps and toxic chemical industries in their communities, the Chipko women can find themselves at odds with their husbands. In the US, these men often work for the polluting industry and see their wives as extreme and uncompromising. In India, the men work in the saw

mills which have been set up to turn forests into cash crops.

Shiva is especially effective in exposing the fallacies of mainstream development thinking. For example, Indian women have been the primary food providers for centuries. Traditional organic agriculture, modelled on the natural cycles of re-use and recycle, has integrated forestry and animal husbandry with farming. Its methods have fed people and protected their resources from erosion and exhaustion for thousands of years. The modern 'scientific agriculture' of the 'Green Revolution', replaces renewable inputs from the farm, such as manure, with non-renewable, hazardous inputs from factories, such as pesticides and fertilizers. It replaces women's work with the work of men and machines. Such a revolution is neither 'green' nor 'scientific'. It is rather a recipe for desertification, soil and nutrient loss, water logging, salinization, drought and famine.

Rural Indian women are "soil builders"; Western male agriculture experts and their colonized Indian male counterparts are, in the words of Shiva, "soil predators". Women are displaced from working in sustainable agriculture to become agricultural labourers in cash crop plantations, and work longer hours and are paid less than men. This 'revolution' in agriculture has aggravated the violence against women already present within Indian society. In the Punjab, the heart of the green revolution, the number of female children who are undernourished is higher than that of undernourished male children. Dowry violence against women is highest in the Green Revolution region of northwest India. This region was the first to use amniocentesis for sex pre-determination in order to kill female foetuses.

Staying Alive is a worldly, passionate book written "to focus and pay tribute to the leadership of millions of unknown women in India struggling for a life." The introduction to the book, however, comes off as condescending towards Shiva, while praising her work. The writer acts as a gate-keeper rather than a portal, constricting the reader's interpretation of Vandana Shiva's ideas, lest they be taken as too woman-identified and thus separate from other struggles.

Patricia Hynes

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Analogy or Homology?

EVOLUTION WITHOUT SELECTION: Form and Function by Autoevolution, by A. Lima-de-Faria, Elsevier, Amsterdam, 1989, 372pp.

Lima-de-Faria has produced two original and exciting books. *Evolution Without Selection* is, in many ways, a natural extension of his earlier work, *Molecular Evolution and Organisation of the Chromosome*,¹ and it develops in detail the implications for evolution of his theory of molecular evolution.

Evolution Without Selection is quite different from anything that has been published by any other evolutionary biologist. It is an idiosyncratic work which reflects Lima-de-Faria's very personal perspective on evolution. I believe that it will have a very considerable and long-lasting influence on evolutionary biology.

The theory of 'autoevolution' involves a radically different analysis of several key biological concepts, such as homology (the similarity of structure in different organisms), which in 1971 was proclaimed "the unsolvable problem".² Lima-de-Faria makes the startling suggestion that everything is homologous, and that we are only dealing with degrees. He claims that there is no superficial resemblance in nature and illustrates his argument with a series of plates showing that not only very different organisms, but also inanimate objects, generate similar patterns, and that these are homologous in that they represent the products of principles laid down in previous evolutions. My favourite illustration is the familiar pattern of RNA transcription where RNA molecules are formed along the DNA axis, which is remarkably similar to the pattern of a Christmas tree. Lima-de-Faria points out that they are similar because they are being produced as a result of exactly the same principles.

There are many biological patterns which we attribute to the existence of the gene which actually predated the gene: for example, the basic shape of leaves and animal vertebrae are already found in minerals. According to autoevolution, the potential to produce the patterns found in minerals and quasicrystals existed long before genes arrived on the biological scene. Hence the gene is not really 'responsible' for the symmetries — it does not create them, it only chooses between them. If Lima-de-Faria is correct, the gene

is a late-comer to evolution.

Lima-de-Faria develops the theme, familiar to readers of his earlier book, that many biological systems which appear to be chaotic at first examination, after more detailed study turn out to be highly organised. A chaotic chromosome, he points out, is open to selection but an organized one is not. The more organized the chromosome becomes, the less it can be affected by external forces.

Finally, Lima-de-Faria compares his 75 central tenets of autoevolution with the principals of Darwinism and Neo-Darwinism. He reviews his position in a refreshingly forthright style: "No selection, selection is a term that must be banished from evolution if its mechanism is to be understood in strict physico-chemical terms". Lima-de-Faria contends that "mutation is directed": that, in contrast to the Neo-Darwinist assumption of randomness at all levels, for autoevolution, order prevails at all levels.

Lima-de-Faria argues that biological evolution is a "terminal process, which has been preceded by three autonomous evolutions". These are the evolution of elementary particles, the evolution of chemical elements and the evolution of minerals. Each of these evolutions followed an order which was dictated by its own rules and these canalized the subsequent levels.

Lima-de-Faria also considers the role of the gene and the chromosome in evolution, the evolution of function, the importance of recognition and self-assembly, extinction, rates of evolution and organism-environment relations. He recognises that the germ line and the soma barrier do not exist in plants and many animals, and therefore concludes that "embryonic development and postnatal events create solutions that evolution is obliged to use".

Evolution Without Selection is a remarkable attempt to elucidate the principles which underlie organic form and it is a stimulating and intriguing book.

David Lambert

David Lambert is at the Department of Zoology, Evolutionary Genetics Laboratory, University of Auckland, New Zealand.

References

1. Lima-de-Faria, A., *Molecular Evolution and Organisation of the Chromosome*, Elsevier, Amsterdam, 1986.
2. de Beer, G., in J.J. Head and O.E. Lowenstein (eds.), *Oxford Biology Reader*, Oxford University Press, 1971.

BOOKS DIGEST

Books which are covered in the digest may be given full-length reviews in forthcoming issues.

- **DEVELOPING AMAZONIA: Deforestation and social conflict in Brazil's Carajas programme**, by Anthony L. Hall, Contemporary Issues in Development Studies, Manchester University Press, 1989, £25 (hb), 295pp.

This study focuses on the massive social and environmental costs of the Carajas programme and concludes that there can be few lasting benefits to the inhabitants of Amazonia from large-scale industrial projects of this type. Hall describes the growing popular resistance to the Carajas programme and draws lessons from the Carajas experience for both Brazilian and global tropical rainforest development.

- **WORLD DIRECTORY OF ENVIRONMENTAL ORGANISATIONS: Third Edition, A Handbook of National and International Organizations and Programs — Governmental and Non-Governmental — Concerned with Protecting the Earth's Resources**, edited by Thaddeus C. Trzyna, California Institute of Public Affairs (PO Box 10, Claremont, CA 91711) in cooperation with the Sierra Club and IUCN-The World Conservation Union, Claremont CA, 1989, \$35 (pb), 176pp.

The World Directory describes more than 2100 organizations in 218 countries, with detailed profiles of international organizations, and listings of key national organizations.

- **NITRATES: The Threat to Food and Water**, by Nigel Dudley, Green Print, London, 1990, £4.99 (pb), 118pp.

In the midst of much public concern in Britain over high levels of nitrates in drinking water, this book claims to be the "first complete book for the general public on the nitrates question". Dudley examines the implications of nitrates in food and water, their effect upon rivers and seas and their contribution to the greenhouse effect, goes on to look at present and future European and British government legislation, and concludes with recommendations as to how agriculture can reduce its nitrate output.

- **THE DIRECTORY OF APPROPRIATE TECHNOLOGY**, edited by Rose Heaward and Charmian Larke, Routledge, London, 1989, £40 (hb), 317pp.

An incredibly wide-ranging and comprehensive source of references on organizations and publications covering all aspects of AT thinking and action. It gives concise yet instructive synopses of books and journals and explanations of the activities of the groups listed.

- **INTERNATIONAL RESOURCE MANAGEMENT: The Role of Science and Politics**, edited by Steinar Andresen and Willy Ostreng, Belhaven Press, London and New York, 1989, £30 (hb), 301pp.

This collection of contributions from scientists and policy makers is the result of a symposium held in Norway in November, 1988, and analyses how science has influenced and ought to influence political policies on pollution and renewable resource management at a national and international level.

- **ENVIRONMENTAL DATA REPORT: Second Edition**, Prepared for the United Nations Environment Programme by the GEMS Monitoring and Assessment Research Centre in cooperation with the World Resources Institute and the UK Department of the Environment, Blackwell Reference, Oxford and Cambridge (MA), 1989, £40 (pb), 547pp.

This catalogue of increasing pollution, disappearing species, multiplying numbers of people, deteriorating health, and increasing resource use is the most exhaustive work of its kind. The data is mostly presented in the form of tables with some graphs, charts and maps.

- **ENVIRONMENTAL SCIENCE: A Framework for Decision Making (Second Edition)**, by Daniel D. Chiras, Benjamin/Cummings, Menlo Park CA, 1989, 531pp.

An interdisciplinary text book for students of environmental problems and their management. Chiras has collated a comprehensive collection of essays, discussions of contentious issues (such as "Is outer space the answer to our population and resource problems") by environmental "luminaries", summaries, suggested lists of further reading, diagrams and illustrations.

Patrick McCully



Letters

Clinging to Species Longevity

Dear Sir,

I read with interest Vol. 19, No. 5, September/October 1989. First, a technical point: the correct spelling, according to binomial nomenclature, for our species is *Homo sapiens*: italicized, capital H, small s. In reading through *The Ecologist* I found this name spelled three different ways, two alone in Alwyn Jones' review of your book *Gaia, the Thesis, the Mechanisms, and the Implications*.

Unfortunately, this murkiness with regard to our species' name — which I hesitate to point out for fear of being cast as a precious academic or backseat editor — does not seem to be unrelated to a broader murkiness with regard to ecological thinking. As recent issues (for example 'Towards an Ecological World-View', Vol. 18, No. 4/5, July/October 1988) are beginning to make clear, the ecological movement, whose eyes were once focused on the relatively narrow political horizons of environmental conservation, is now lifting its gaze skyward to the vast universe of philosophy. The potential for ecology to reinvigorate philosophy — and as Denys Trussel rather caustically points out, the arts — is great. Such a merger of ecology and philosophy could even bring about the sort of planetary cultural renaissance — or rather birth, since the likes of it have not yet occurred on the surface of the Earth — implied by the term 'ecosophy'.

Recognizing Gaia as an immanent ontotheological equivalent of the transcendent God of the Middle Ages may not be a particularly 'happy formulation' (see Arne Naess, Vol. 19, No. 5) but Gaia nonetheless provides the basis for the reevaluation of human values, from financial to ecological, from shallow and fleeting to rich and deep, from national to planetary. Gaia, as Jones correctly suggests, also provides the basis for the much needed interdisciplinary dovetailing of the sundered sciences, together with the political realm of ethics and the soteriological realm of praxis.

But let us not kid ourselves: there is a price to pay for the deep ecological shift implied by the Gaia hypothesis. Too many

are 'New Agers', spoiled children bypassing meat and vegetables to grab only the sweetest desserts at the very nutritious and carefully arranged Gaian buffet.

In this context, Jones' book review is emblematic. After quoting Lovelock to the effect that Gaia is a homeorrhetic entity that may, if sufficiently ecologically stressed, jump to a new steady state, "a new stable environment where many of the current range of species will be eliminated", Jones goes on to paraphrase this very quotation with the subtle but revealing gloss that a "new and qualitatively different stability will be achieved with few, if any, of the existing forms of life".

It is this "if any" which warns us of Jones' tacit desire (and he is not alone) to exaggerate the role of *Homo sapiens* within geophysiology; the implication, also encountered in discussions of the biological effects of nuclear war, is that we human beings have it within our destructive power to annihilate all known life forms — that we can, in a word, *kill* Gaia. This is exaggeration, ecological sensationalism, a New Age conceit *par excellence*. Gaia the goddess differs from her ontotheological progenitor, the male Judeo-Christian monotheistic deity, precisely in the fact that she is immanent, palpable, the real-world heiress who survives when the platonic tale of two worlds is revealed as a comforting but ultimately dream-based fable: God, like art, is dead, but the goddess, in all her non-human glory, *lives*.

Jones, like so many well-meaning ecological thinkers, wants to have his cake and eat it too. Citing Lovelock's claim that the primary dangers of Chernobyl and ozone depletion consist of a slight increase in cancers in white people living in the northern temperate zones, Jones feels "disquiet" and wonders in print whether "most, if not all, life forms are susceptible to abnormal levels of radioactivity in the environment? And could there not be a point beyond which Gaia would be unable to cope with such excesses?"

Such sentiment resembles feelings inspired by the one-to-one astrological relation in medieval cosmology of the small world of man to the great world of the heavens: if increased levels of radiation, as Jones presumably thinks, can harm, even kill a human, might not it do the same to "Gaia"? In fact, Gaia, the biosphere, is not human: she is much more. We are one only of some 30 million species, all of whose ancestors inhabited and *evolved* in a planetary environment with little atmospheric oxygen and therefore no ozone layer protecting them from radiation.

Although the great and difficult topic of relating philosophy and Gaian ecology has only been broached here, let us conclude with the caveat that we should be on our guard when confronted by grandiose — if covert — identifications of the nexus of life forms on planet Earth with the single and (future 'historians' will probably deem) un-spectacular species *Homo sapiens*.

It is not even clear that Gaia is an 'organism', let alone an entity to be cavalierly identified with the biological

status of a mortal animal. In fact, Gaian theory is relentlessly Copernican in that it continues the decentering begun with the decline of geocentrism to the point where we can no longer — with philosophical love of truth — bear to consider ourselves, *from the Gaian standpoint*, as a *chosen* species.

Humans are neither the heart nor the brain of the body ecologic. The remarkable destabilizing I see in articles such as those of Jones is less the one done to the planetary environment by human technology than the one done to the pride of an organism who has released his hold on individual immortality but clings all the more desperately to the illusion of species longevity.

Yours faithfully,

Dorion Sagan

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Alwyn Jones Replies:

The convergence of philosophy and ecology, for which Dorion Sagan convincingly argues, must mean the rejection of anthropocentrism not its reinforcement. Far from being the "spoiled children of the New Age", the adherents of the deep ecological approach seek to integrate humanity into the interconnected web of life which is Gaia.

*Such detachment from its assumed position at the centre of the stage gives the species a viewpoint from which it can reflect on its own hubris. Whatever Sagan claims, it is indisputable that *Homo sapiens*, or more particularly its industrial 'sub-species', is unique among species in its apparently unlimited appetite for destructiveness. I did not intend to give the impression that *Homo sapiens* could 'kill' Gaia in any ultimate sense, but it is no exaggeration to say that Gaia "as we know it now" could succumb to our demonic ways. This is not ecological sensationalism: it is a realistic appraisal of the activities of a single species whose 'ingenious' attempts to attain mastery over nature for its own benefit are now so patently counterproductive.*

I fail to see how Sagan can assert that the "illusion of species longevity" is the driving force which fuels the ecological concern of those of us he has labelled as the "spoiled children". Indeed it is not just our longevity which is at stake, but that of all those other forms of life which comprise Gaia. Countless thousands of species have already been eliminated as a result of our actions, and the process is continuing. The crucial issue is therefore a moral one. Do we not have a responsibility to ensure as far as we can that all existing forms of life, including our own, subsist until Gaia decrees the end of our respective allotted spans?

If we accept this contention it should be incumbent on us to so arrange our activities that there is the minimum of interference with the rhythms and patterns of the Gaian world. Whether Sagan likes it or

not, the fate of Gaia in its present, but not of course ultimate, form must depend on the success with which *Homo sapiens* can reverse the anti-Gaian tendencies which it has itself created.

Sagan's letter is not easy to read. Its jargonistic style, and excessive use of metaphor, serve more to mystify than elucidate. But his disparaging remarks about the motives of some of those who seek to improve the world are clear enough. Such divisive thinking is nothing short of invidious at a time when concerted action on the part of the whole species is necessary if we are to avert the threat of impending ecological catastrophe.

Yours faithfully,

Alwyn Jones

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Change as a Pathology

Dear Sir,

I always look forward to reading your articles on the current state of the environment. However, I do not think that Edward Goldsmith's article, 'Gaia and Evolution' (Vol. 19, No. 4, July/August 1989), fits this description. The subject matter of this article belongs more to the forum of a magazine such as *Environmental Ethics*.

Having read 'Gaia and Evolution', I should like to query the degree of emphasis it places on the homeostatic aspect of Gaia. The process of change appears as a pathology. The logic of this article implies that we are all the result of a number of life processes gone wrong. The definition of evolution, however, is 'a process of development'. If Gaia were in a state of perfect homeostasis the world would never have developed beyond the state of primaevial bacteria.

Yours faithfully,

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Marxism in Ecotopia

Dear Sir,

Robyn Eckersley's suggestion in 'The Road to Ecotopia? Socialism Versus Environmentalism' (Vol. 18, No. 4/5, July/October 1988), that Marx's views are inherently anti-ecological is based on a misunderstanding or misrepresentation of Marx's thought.

Eckersley accuses Marx of "human chauvinism" and of being "unashamedly anthropocentric", and contrasts this unfavourably with John Muir's biocentric approach. According to Eckersley, Marx did not recognise the "intrinsic value of non-

human phenomena". This allegation, however, is based on a gross misunderstanding of Marx's labour theory of value. For Marx, the economic value of a commodity is determined by the quality of human labour it embodies, measured in "socially necessary labour time". When Marx spoke of the value of a commodity he was referring to its exchange-value and not its desirability or merits. Similarly, any product which fulfils somebody's need is, by definition, a use-value, again without implying anything about its desirability or merits. For example, a nuclear missile, like any other commodity, is both a use-value and an exchange-value. But this hardly means that Marx would have praised it as being morally desirable and as having a high intrinsic worth!

Eckersley claims that: "According to Marx, the key process creating value is labour. Nature (often referred to as the 'external world'), on the other hand, is value free, it makes no normative claims upon us, it is a raw material to be bent and transformed as an instrument of human labour. It is thus valueless until such time as human labour (and its extension, technology) has acted upon it. Nature therefore has no intrinsic worth". This is a very crude distortion of Marx's views. Marx certainly argued that since nature is not the product of human labour it therefore has no intrinsic exchange-value, but he certainly did not mean by this that nature is utterly worthless and should be subjected to unbridled human exploitation!

To imply that Marx's concentration on human and social issues means that he did not care about the impairment of nature is just as absurd as arguing that Muir's concentration on environmental issues means he did not care about poverty and injustice. As a witness to the havoc wrought on the working masses by the industrial revolution, it is understandable that Marx devoted his energies to developing a devastating critique of capitalism and to radical political activity, just as it is understandable that Muir, in quite different surroundings, chose to concentrate on environmental issues.

As a philosophical materialist, Marx saw humanity as the highest product of natural evolution. Humanity must have some form of intercourse with nature in order to survive, and this should be organized as rationally as possible. Marx and Engels prided themselves on their scientific approach and their views largely reflect the materialistic science of their time. Engels, however, made a crucial distinction between mechanistic materialism and his own, and Marx's, dialectical approach. The essence of the dialectical method is to apprehend the real world in its concrete interconnections. Engels also referred to motion as the "mode of existence of matter". These two elements — the interrelatedness of everything and ceaseless, dynamic motion — are two of the central themes of the new physics and the holistic paradigm (and also of Eastern mysticism!). In that respect, therefore, Marx and Engels went beyond the constraints of the scien-

tific views of their day.

Fritjof Capra also draws attention to the holistic elements in Marx's outlook. In *The Turning Point*, he quotes the following passage from Marx's *Economic and Philosophic Manuscripts of 1844*: "The worker can create nothing without nature, without the sensuous external world." Capra comments that: "Marx's view of the role of nature in the process of production was part of his organic perception of reality... This organic, or systems view is often overlooked by Marx's critics, who claim that his theories are exclusively deterministic and materialistic. In dealing with the reductionist economic arguments of his contemporaries, Marx fell into the trap of expressing his ideas in 'scientific' mathematical formulas that undermined his larger socio-political theory. But that larger theory consistently reflected a keen awareness of society and nature as an organic whole". Given Capra's generous appraisal of Marx, it is difficult to see how Eckersley comes by her notion that he dismisses Marx as "irrelevant".

Eckersley criticizes the traditional picture of communism as a "technological dream world", which she says will "inevitably serve to alienate and enslave the masses, whilst at the same time undermining our biological support system". However, there is no question that advanced technology has a tremendous liberating potential — it is its misuse that should be criticized. Virtually all of the early Marxists made the mistake of regarding the technical-economic infrastructure of monopoly capitalism as 'neutral' and as providing a sound 'material base' for socialism. The fact is that in the long term small-scale production, soft technology and qualified growth will prove more efficient, environmentally acceptable and less alienating.

The relations of production of 'advanced' capitalism — extensive divisions of labour, a hierarchy of technical and managerial 'experts' and excessive material incentives — are also far from neutral. What is required is a gradual shift in emphasis from competition to cooperation in every sphere of life and this is only possible by extending democratic participation at every level and by inculcating a new social (and even planetary) consciousness to replace the prevailing individualistic and materialistic consciousness.

Eckersley makes it clear that she is against *laissez-faire* capitalism, but does not specify in any detail what her 'ecotopia' will look like, nor does she indicate a strategy for achieving it. But perhaps she would agree that popular struggles and campaigns on every front — social, cultural, political, economic and environmental — are of crucial importance in the move to a sustainable society and that this goal will be promoted by the broadest possible cooperation between different groups.

Yours faithfully,

David Pratt

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Contact Pearl Allan, Conference Secretary, CEMP, 48 College Bounds, Old Aberdeen, AB9 1FX. Tel: 0224 272480; Telex: 73458 UNIABN G; Fax: 0224 487658.

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Contact: Dr. Luigi Alberton, Via Trento 29, 35014 Fontaniva (Padova), Italy. Tel. 0039 49 5970220.

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17-21 February, 1990. Bordi, Maharashtra, India.

Prakruti is a voluntary association of members committed to promoting a development process for an environmentally sustainable society through organic/natural farming, optimum utilization of natural resources and water management as well as natural living.

For more information contact: Prakruti, c/o Kisan Menta, 123 Mahatma Gandhi Road, Above State Bank of Travancore, Bombay - 400 023, India.

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The Nicaragua Solidarity Campaign is looking for volunteers for soil and water conservation projects. Each brigade of 20 people will spend 4 weeks in Nicaragua, 3 weeks work, followed by a study tour of talks and visits. Members of the brigades will be either staying with Nicaraguan families or in communal accommodation.

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For further information contact: Helen Yuill, Nicaragua Solidarity Campaign, 01 253 2464.

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CARSTOP is a single issue pressure group campaigning to alter the perception of the car and private motor transport generally as the natural answer to the needs of personal and goods transport.

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Second Annual Conference: The Society for Ecological Restoration. The programme includes "Prairie Restoration", "Restoration and Global Climate Change", "Setting Standards for Monitoring Restoration Projects", "Restoration and Recovery of Endangered Species", "Restoration Philosophy" as well as field trips to the famous restoration project at Fermi National Laboratory. The conference will be held from April 29-May 3 1990 at the Sheraton International Hotel at O'Hare, Chicago, USA. More details from William R. Jordan (III), The University of Wisconsin Arboretum, 1207 Seminole Highway, Madison, Wisconsin 53711, USA (Tel. 608-263 7889).

SMALLHOLDING/SELF SUFFICIENCY COURSES at College Farm, College House, Penstrowed, Newtown, Powys SY17 5SG. Write for details, or telephone on 0686 628582.

PROFESSIONAL TRAINING for Countryside Staff. New programme available from Peter Townsend, Principal, Peak National Park Centre, Losehill Hall, Castleton, Derbyshire S30 2WB.

MIDDLE WOOD GREEN COLLEGE. Write for our programme on week-end courses on green concepts aimed at helping individuals to take action at a practical and spiritual level. Middle Wood Trust, Roeburndale West, Lancaster LA2 8QX.

MASTER'S PROGRAMME IN HUMAN ECOLOGY, a postgraduate course organised by the Faculty of Medicine and Pharmacy at the Free University (Vrije Universiteit) Brussel. For details for this 2-year course write to: Professor L. Hens, Human Ecology, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussel, Belgium. Tel 02-641 3424.

THE CENTRE FOR PROFESSIONAL ADVANCEMENT is again presenting courses in many areas of Technology. A full curriculum listing available courses and a brochure describing the courses will be sent on request. The Centre's address is: Palestrinastraat 1, 1071 LC Amsterdam, The Netherlands. Tel 020/662 3050, Fax 020/797501.

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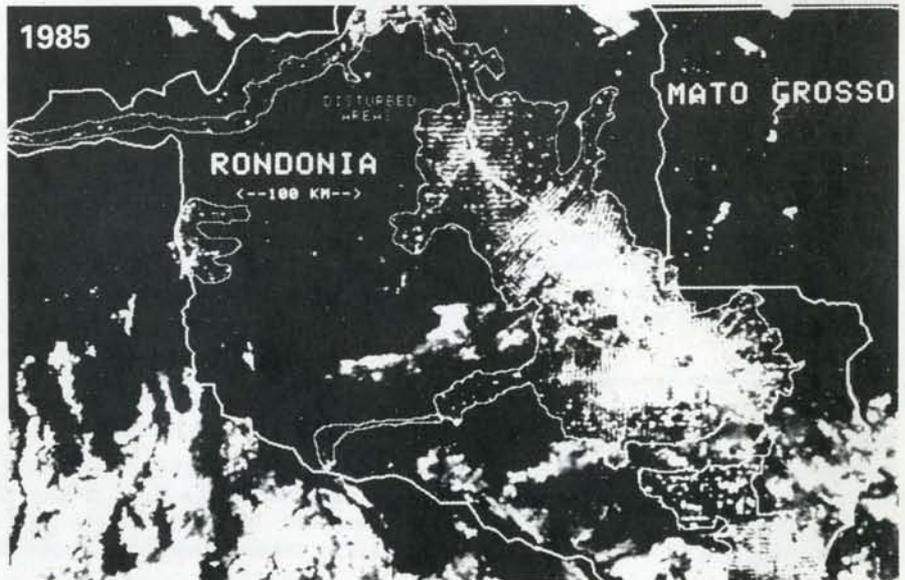
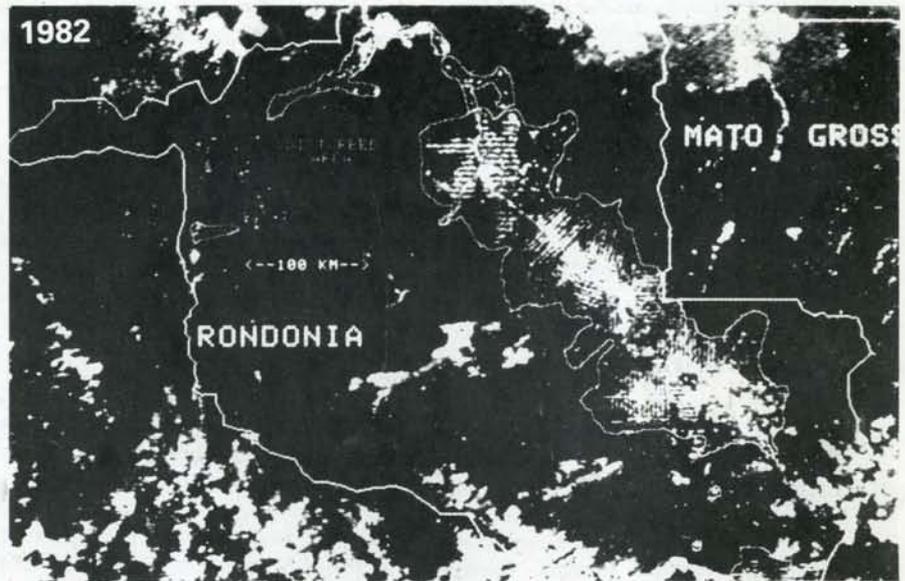
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